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PRACTICAL INQUIRY

INTO

DISORDERED RESPIRATION.

BRITISH MUSEUM

A

PRACTICAL INQUIRY

INTO

DISORDERED RESPIRATION;

DISTINGUISHING,

THE

SPECIES OF CONVULSIVE ASTHMA,

THEIR CAUSES, AND INDICATIONS OF CURE.

THE SECOND EDITION, CORRECTED,

WITH AN

APPENDIX.

BY ROBERT BREE, M.D.

> "Quis diu expirat? Omnia corporis aut incommoda aut pericula per me tranſierunt; nullum mihi videtur moleſtius. Quid ni? Aliud enim, quicquid eſt, ægrotare eſt; hoc eſt animam agere. Itaque, medici hanc meditationem mortis vocant."
>
> Seneca de Suſpirio, Epiſt. LIV.

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1800.

> “ Porro obſervandum, quoties hujuſmodi diſtinctionem morborum exponere conati fuerimus, id commodi oriturum, quod hujus diſtinctionis vel defectus, vel errores, facillime percipientur, et cum percepti, vel ad obſervationes jam factas accuratius conſiderandas, vel ad obſervationes poſtea diligentius faciendas, ducent.”
>
> CULLEN PROLEGOMENA.

BRITISH MUSEUM

INTRODUCTION.

THE firſt Edition of this INQUIRY was publiſhed with ſome precipitation, and had the faults of diffuſeneſs, and want of perſpicuity, but its defects did not prevent the ſanction in this country, and abroad, of names long celebrated in ſcience.

It has been tranſlated into two languages of the Continent; and the Profeſſor of the Practice in the Edinburgh Univerſity, has ſo far honored it with his public approbation, as to give it a title to improvement in a Second Edition, which has been much demanded.

I cannot then regret, that I left it, with all its faults, to the teſt of examination for three years; as whatever merit it poſſeſſed, was diſcovered in oppoſition to the influence of ſuch diſpleaſing circumſtances. I muſt, however, remark, that, in the copiouſneſs of the firſt Edition, there are authorities, which, if I had not adduced, I might have expected the charge of aſſuming too much; as, by adducing them, I hazarded that of writing too much. Opinions on ASTHMA were ſo eſtabliſhed, that facts which oppoſed them might have been denied, if full evidence had not been given in their ſupport.

On this account I ſaw, with indifference, that the INQUIRY would be conſidered tedious by many readers who were not likely to aſſent to my method of proof, or to purſue an object which might invalidate a theory they had found agreeable, becauſe readily practiſed upon.

I purpoſed to inquire, what had been really done by any Author, at any time, upon the ſubject of ASTHMA? In ſuch a retroſpect, repetition could ſcarcely be avoided; but it ſeemed to be neceſſary, in oppoſing with ſucceſs, the obſtinacy of modern prejudice. Ancient deſcription correſponds with the preſent ſtate of the diſeaſe, although modern obſervation ſlightly acknowledges the reſemblance. In our times, the principal feature is a ſubordinate object of attention; and if it were proved to be a cauſe by every other mode of evidence, demonſtration would be ſtill demanded before a material excretion, obvious to the ſenſes, would be preferred to the theory of an inviſible action that had rivetted the attention of the Schools.

I therefore took the aid of diſſections, to which I owe a part of the facts leading to a concluſion.

It may be ſaid, that the appearances in theſe diſſections did not belong to caſes of Convulſive Aſthma, or that they were effects of the diſeaſe: but compare them with the deſcription of Cælius Aurelianus, and afterwards with that of Dr. Beddoes, in the inſtance of Mr. Baynton's patient, and the identity will be manifeſt. Will the objectors to minute inquiry ſee no advantage in this coincidence in character and deſcription? and, if they do, is it a ſubject of reproach, that the antients were examined for the purpoſe of recovering a natural record that had been ſuppreſſed or loſt?

Thus the moſt copious effuſion may happen, and the patient may recover; and the effuſions that were found by diſſection were not neceſſarily *effects* of diſeaſe, and ſtill leſs probably the conſequences of death.

That diſeaſes alter by time or climate may be an argument againſt going out of our country, or looking beyond the preſent period for information. But is it, indeed, probable, that one of the ſtrongeſt features of a diſeaſe of ſo peculiar a character, ſhould be erroneouſly deſcribed in every age; or, if truly deſcribed, that it would ſuddenly diſappear in this age, and in the meridian of Edinburgh?

But the doctrine that ASTHMA exiſted *without a manifeſt cauſe, or any attendant diſeaſe*, ſuperſeded demonſtrated facts, and was calculated to produce the worſt effects in practice.

Here I muſt diſclaim the intention of depreciating the high reputation which muſt ever adhere to the name of Cullen. I confine my objections to his theory on ASTHMA; nor do I offer them with ſatisfaction. I owe his memory reſpect, and I value his labours, which have been ſo conducive to the intereſt of medicine. Were his ſucceſſor to deliver a doctrine, that I had found queſtionable in a high degree, and productive of uncertainty or inconvenience in practice, I ſhould not heſitate to give an opinion, oppoſing its influence. But for Dr. Gregory, I have a friend's regard, united to a pupil's gratitude, and reſpect matured by long reflection on his talents. A conteſt, with a view to perpetuate poſthumous fame in every particular of an extenſive ſyſtem, is more than the late Profeſſor ever meditated upon: and it will be an arduous taſk to maintain it. "Rational Practitioners," ſays a liberal and judicious writer, "diſdain "to rank themſelves as implicit followers "of any dogmatiſt, however celebrated;" yet there are others whoſe captious tenacity would preclude the queſtioning of tenets they had themſelves received; and who prefer inſulting the motives of their contemporaries, to examining, with impartiality, the opinions of the dead.

A friendſhip with Dr. Brown, produced me the honor of his correſpondence, in which principles were diſcuſſed rather than dictated. I never obſerved his kindneſs to cool in conſequence of my oppoſition to particular points, which I thought his ardour carried too far.

His ſyſtem is not more prejudicial to induſtry than the Spaſmodic theory, as it regards Asthma, ſeems repugnant to inveſtigation. It affords a conſtant reſource to the indolent or incurious from the trouble of tracing a cauſe, really exiſting in ſome material to be removed, or ſome injured function to be reſtored.

The uſage and authority of a few years made it neceſſary to go back for ages into the hiſtory of Asthma, whilſt the *onus probandi* ſhould have been ſuſtained by thoſe who gave the diſeaſe a new character. I endeavour to prove the negative of their propoſition, affirmed in defiance of all former obſervations, and which they offered no evidence to ſupport.

But the moſt valuable object in recovering the *ſtatus quo*, is the means it ſupplies of explaining the principle of other ſpecies, where the cauſe is leſs clear.

It has been ſaid that citations of authors are not a certain proof of learning; but if an acquaintance with theſe authors were eſſential in an important inquiry, I think that before it were attained, the inference from the want of it would be determined to be a juſt, or a fallacious one.

Having experienced the bad effect of reading, I had not applied to medical books for a conſiderable period, and was not gratified by the peruſal of Zoonomia, till the year 1796, when it had been ſome time publiſhed. I had previouſly ſatisfied my mind as to the principles of the diſeaſe I had ſuffered; and I then ſaw, with great emotion, that they were ſupported by the pathology of that admirable work, whilſt my views were enlarged by the rich aſſemblage of natural facts that it contains.

It is no uncommon thing to comtemplate a fact newly proved, without ſurprize, though its exiſtence had previouſly been diſputed, or even conſidered impoſſible. Some carry this apparently artleſs, and incurious manner to a great length. They do not aſſent to a poſition, nor oppoſe it; but, when convenient, embrace it, as a portion of eſtabliſhed knowledge, which having been long acquired, had become familiar.

If the Public were poſſeſſed of the cauſes of the Species of ASTHMA before my INQUIRY appeared, it muſt have happened by accident.

No one had looked at the external ſigns as effects from which cauſes could be traced; the ſigns themſelves were not clearly underſtood, and ſtill leſs their indication.

It is eaſy to aſſert cauſes, but the method of induction can alone eſtabliſh their value and truth. The reſult may be called theory; but a "collection of inferences drawn from "facts," is entitled to practical confidence, and a ſanction which can never be given to any theory founded on mere hypotheſis.

But inferences, from facts, will not always be the ſame; and I am far from aſſuming that mine are infallible. I have attempted a method that is apparently proper, and it has produced me a portion of ſucceſs on which I reflect with ſatisfaction.

Theories, built upon hypothetical foundations, are one cauſe of the turn for quackery that infeſts this country: and an authoritative delivery of principles that are confuted by nature, may be as injurious to the credit of phyſic here, as the tenets of blind bigotry in other countries have been to the profeſſed objects of morals and religion.

And yet it is to be lamented, that uſeful reſearch in medicine is frequently diſdained; and, that copious as the *materia medica* is, the high-ſounding praiſe of ſome new article, is more countenanced than a juſt diſtinction of diſeaſes, which can alone inſure it a ſucceſsful application.

The experienced and the grave are confounded, or abaſhed into ſilence, by the confident aſſertions of the bold and ſuperficial; and, when the bubble burſts, they too often permit the author to eſcape from his own recollection of what he had promiſed. Are not theſe practices ſo nearly allied to plain empiriciſm as to challenge contempt and reprobation, inſtead of credit and adherency? But if Phyſicians yield to the impulſe, we cannot be ſurprized that a credulous Public ſhould follow their example.

In fact, empiriciſm ſeems to infect all ranks, and to meet with ſo little oppoſition from the adherents of ſcience, that the former ſeduces multitudes to her ſtandard, while the latter, by a ſort of negative connivance, ſeems to favor the deſertion.

The prediſpoſition to this mania is man's ignorance of his own body, and the natural laws that regulate its motions. It is of general intereſt to know, that the external muſcles re-act in a convulſive manner to relieve the internal functions from injury or interruption: and that Convulſive Aſthma is a muſcular re-action to accompliſh this object.

We have a DARWIN and a BEDDOES to inſtruct, but we want more HAYGARTHS to act; and who will dare popular clamor, for the honor of truth and his profeſſion, like the laſt?

If true principles, exertion, and diſintereſtedneſs, be neglected, we may at length be mortified by that ſtate of public opinion which prevailed at Rome when the books of HIPPOCRATES were contemned, and the noſtrum of Mithridates was enquired for with ſolicitude.

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A
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PART I.

SECT. I.

Aſthma a general name for diſordered reſpiratiou.—Violent muſcular action indicates irritation ; *as in the ſtomach, gall duct, bowels.—Irritation in the pulmonary organ.—* Difficulty of breathing, *this term does not explain the natural fact; always to be referred to* irritation.*—A more preciſe idea of the inſtruments of exceſſive reſpiration.—Analogy of the perception of* irritation *in the lungs, and in the rectum and bladder.—Motus Medicati of Gaubius.*

ASTHMA, in its original meaning, long continued to embrace all the caſes of difficult reſpiration: but noſologiſts have lately confined the term to a peculiar form of this general affection. If we go back to the time of Willis, we ſhall not find in the period which has elapſed ſince his writings appeared much improvement in the pathology or treatment of this diſeaſe. “ Aſthma,” ſays this author, ” dicitur ab ασθμαινειν, (quod eſt “ anhelare, ſive difficulter reſpirare) et deſcribi

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" poteſt, quod ſit *reſpiratio difficilis, crebra, et anhe-" *loſa, cum magna pectoris agitatione, et plerumque citra* " *febrem.*"*

Frederic Hoffman gives the ſame latitude to the term in the following deſcription:

" Hoc vero (Aſthma) ſecundum noſtram ſen-" tentiam nihil eſt, quam *impedita, et laborioſa* " *admodum reſpiratio, cum ineffabili anxietate, et præ-* " *cordiorum anguſtia juncta, liberum ſanguinis per* " *pulmones circuitum turbans, a variis cauſis ſuborta,* " *periculi ſuffocationis non expers.*"†

Theſe authors adopted the Greek word as the head of a claſs of ſpecific forms, and afterwards diſtinguiſhed the ſeveral cauſes which, according to their obſervations, were productive of that uniform apparent effect " difficult reſpiration."

If it be neceſſary to define the diſeaſe, I would ſay, agreeably to the principles in this inquiry, Aſthma *is an exceſſive contraction of the muſcles of reſpiration, uſually called difficulty of breathing without acute fever, excited by irritation in ſome one of the viſcera which theſe muſcles ſerve.*

Under this generic definition are comprehended all affections not febrile, attended by uncommon action of the muſcles uſed in reſpiration. The influence on theſe muſcles being the ſame in kind, though diſtinct by ſituation and quantity of force, as it may exiſt in ſome of the lower viſcera, or in the lungs. In the ſpecies commonly termed *convulſive or ſpaſmodic*, the muſcles are contracted with more violence than in any other, but the contractions in this caſe do not obey any law, nor aſſume any form which is not common to the action of the ſame muſcles in milder inſtances of dyſpnœa.

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* Thomæ Willis Opera Omnia. Genevæ, 1680. Tomus Poſterior, Caput. xii. de Aſthmate.

† Frederici Hoffmanni Medicin. Rationalis Syſtemat. Tom. 3. Sect. II. Cap. II. § II.

The difficulty of aſſigning to a diſeaſe its true origin, will be conſiderably encreaſed by neglecting a ſtrict obſervation of its characteriſtic ſymptoms, but Aſthma has been more ſubjected to the caprice of hypotheſis and prevailing theories, than any others whoſe appearances could be as diſtinctly traced to a material exciting cauſe.

Spaſmodic contractions of the alimentary canal, excited by particular irritations, have been conſidered by all phyſicians as clear evidence of the impatience with which the animal ſyſtem ſuffers the ſlighteſt interruption of its functions. It is agreeable to reaſon and philoſophy to infer that ſuch actions, in whatever organ they occur, are exerted by nature for ſome ſalutary end. If a material ſtimulate the ſtomach by its quality or quantity, and impede the digeſtion of food, it muſt be ejected by vomit for the ſafety of the body. If a gall ſtone ſtop the duct, and prevent the diſcharge of bile into the bowels, the animal motions are encreaſed, and the exceſs of muſcular action is intended to remove the obſtruction. If ſcybala be included in the cells of the colon, there is no regular periſtaltic motion after the inconvenience has been ſelt. Convulſive muſcular contractions will ſupervene, and continue till the offending matter be diſcharged.

Alexander Munro, ſenior, has ſtated the nature of muſcular exertions for the relief of the body as follows: " Whenever the uneaſy ſenſation, pain, is " raiſed by the too ſtrong application of objects, " a ſort of neceſſity is as it were impoſed upon the " mind, to endeavour to get free of the injuring " cauſe, by either withdrawing the grieved part " of the body from it, as one retires his hand " when his finger is pricked or burnt ; or the in- " juring cauſe is endeavoured to be forced from " the body, as a teneſmus excites the contraction " which puſhes acrid feces out of the rectum. In " both theſe operations, a convulſive contraction " is immediately made in the leſed part, or in " the neighbourhood of it ; and if the irritation is " very ſtrong or permanent, the greater part of " the nervous ſyſtem becomes affected in that " ſpaſmodic or convulſive way."*

The cauſe and object of theſe convulſive motions are alſo ſtrikingly delineated by the author of Zoonomia. Convulſions naturally follow the irritation of a fibre, and may be juſtly conſidered as evidence of ſome injury to be repelled, or ſome offenſive matter to be diſcharged.†

But if theſe natural laws have been applied in ſome inſtances of violent muſcular contractions,

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[*] Alex. Munro, ſenior on the nerves 66. k.

[†] Vide Zoonomia Vol. I. Sect. VIII. . and X. 2.

yet irritations ſeated in the viſcera of the thorax or abdomen which may produce the convulſions of Aſthma, have been much neglected: though any irritation in theſe cavities may cauſe the aſſociated actions of all the muſcles of reſpiration in conformity to the above principles; and though there be clear evidence in many caſes that they occaſion effects which are common to all the ſpecies of Aſthma.

A vomica, or ſome ſuch oppreſſive inconvenience, is a cauſe ſo undeniable as to preclude diſpute, but even here it has been the cuſtom to conſider the extraneous matter with too ſlight a reference to the principle by which it offends, and rather to ſpeak looſely of a mechanical obſtruction, than to attempt the diſcovery of a common cauſe by which the effect may be explained, agreeably to the ſimplicity of natural laws.

Aſthma is ſaid to be diſtinguiſhed by difficulty of breathing. "*Spirandi difficultas,*"* but it is neceſſary to underſtand in what ſenſe the expreſſion is to be taken; ſince terms may have been long applied to a diſeaſe and received by preſcription as a proof of its character, when examination may ſhew the fallacy of the concluſion.

It is certain, that when no unnatural irritation exiſts, the pulmonary functions are carried on in the calmeſt manner, and there is neither an excitement to full inſpiration, nor a neceſſity of renewing, by one effort, the whole meaſure of air which filled the cavities of the lungs. Reſpiration has frequently been ſo imperceptible in ſome conditions of the body, that obſervers have been uncertain whether life were extinct or not.

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* Cullen. Noſolog.

The quantity of air inſpired is alſo different in different men, and in the ſame man at different times: hence philoſophers have varied in their accounts of the meaſure of air taken in at each inſpiration.

Borelli* makes the quantity to be from 15 to 20 cubic inches in one ordinary inſpiration, whilſt Dr. Goodwin ſays, the greateſt quantity received in the ſame effort, is 12 cubic inches, expanded in the lungs to 14.

The quantity uſually expired is equal to 40 cubic inches, as ſtated by Meſſrs. Jurin, Hales, Haller, Sauvage, Menzies, &c.

Dr. Goodwin † informs us, that the air remaining in the lungs after complete expiration, is 109 cubic inches, and that the proportions of the dilatation of the lungs before and after a healthy inſpiration, are as 109 to 123.‡

But according to Dr. Menzies,§ the dilatation of the organ in the ſame circumſtances, is in the proportion of 179 to 219.

There is, therefore, in health, no determinate quantity of air conſumed in reſpiration; and in diſeaſe, if an organ of the breaſt or belly be not irritated by ſome extraneous matter, the reſpiratory muſcles are not forced into any unuſual action, though the difference between the efforts of "an *ordinary* and a *full* inſpiration, is as 14 to "200 cubic inches."[§]

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* On the Motion of Animals, p. 119, 133.

† Connection of Life with Reſpiration, p. 27. ‡ Goodwin, p. 37.

‡ Menzies on reſpiration by Sugrue, p. 32.

The *difficulty* will then be ſaid to conſiſt in obtaining, at each inſpiration, a meaſure of air equal to 12 cubic inches, which is ſufficient for the ſyſtem in ordinary health: yet it is not ſhewn with how ſmall a proportion of atmoſpheric air life may be ſuſtained, whilſt its purity remains at the uſual ſtandard. In ſleep the inſpirations are very infrequent, and ſometimes without any perceptible elevation of the breaſt. But animals paſs whole winters in ſleep[*], and emerge from it in ſpring with increaſe of fat.

Divers in the pearl fiſheries are ſaid to remain under water half an hour or longer. Diemerbroeck[†] relates an inſtance of a diver remaining in the ſea that length of time under his obſervation.

A ruſtic appeared to die of the plague, and after three days diſcovered no ſign of reſpiration, but on being carried to the grave recovered, and lived many years afterwards.[‡]

Inſtances of apparent death from drowning are numerous, and conſequent recoveries ſince the eſtabliſhment of the Humane Society are authenticated beyond ſuſpicion or doubt, to the honour of that invaluable inſtitution.

[§] Vide Dr. Goodwin, p. 32. note.

[*] Haller Element. Phiſiolog. I. 39.

[†] Anatomes, Lib. 2. p. 464.

[‡] Diemerbroeck Tractat. de peſte. Lib. 4. hiſt. 85.

Many curious hiſtories are extant of perſons rouſed from the tomb of death by accident or deſign, and may be ſeen in Diemerbroeck, Lib. II. Joannes Mathæus Quæſt. Med.—Philip. Salmuth. Cent. 2. Obſ. 86, 87, 95.—Hildanus Cent. 2. Obſ. 95, 96, and other writers.*

It would appear from theſe circumſtances that the animal œconomy will admit of great latitude and ſtill exerciſe its functions, though the quantity of air inſpired be much ſmaller than it is poſſible to aſcertain.

Haller attributes to the act of expiration, ſuch a condition of the lungs as even obſtructs the circulation of the blood through them.

" In expiratione vero pulmo undique urgetur, " et in multo minorem molem comprimitur: " vaſa ergo ſanguinea breviora quidem fiunt cum " retractis bronchiis, eademque anguſtiora nunc " ſunt, ſiquidem pectus ſecundum tres ſuas dimen- " ſiones arctatur."†

In this ſtate of collapſe recurring at every expiration we ſhould, at all events, find great diſtreſs alternating with the inſpirations, if the freedom or difficulty of breathing were to depend very critically on the portion of air meaſured out of the atmoſphere, and received in the cavities of the lungs. This nicety is not acknowledged by the œconomy of the pulmonary ſyſtem in its ſimple and healthful arrangements, but as ſoon as the organ ſeels the inconvenience of unnatural compreſſion, the muſcles are excited into more or leſs energy of action. If the compreſſion be external to the air cavities of the lungs, the labour will not be ſo great as if the cavities themſelves were obſtructed, and the preciſe ſymptoms of periodic convulſive Aſthma may not all be preſent, but *continued Aſthma* or *Dyſpnœa* will.

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* Add to theſe facts, the curious relations of the diſcovery of living toads in the ſtems of elm and oak trees, by the Academy of Sciences of Paris, 1719, 1731.

† Haller, Lib. VIII. Sect. 4.

Whenever, then, a compreſſion of the lungs, or organic derangement irritates the organ, the effort which has been commonly called *difficulty of breathing* is excited. In the inſtance of hydrothorax, the compreſſion ariſing from an extraneous material, there is conſiderable dyſpnœa, but in the expiration of Haller the compreſſion being a natural operation of the ſyſtem is not attended with uneaſineſs, and ſcarcely with conſcious perception.

It may therefore be concluded, that this popular term can only relate to the extraordinary contractions of the reſpiratory muſcles, which are deſigned to remove offence; there being no data in exiſtence to prove that the functions of the animal ſyſtem will be ſtopped by the atmoſpheric air being diminiſhed to any ſpecific meaſure, however ſmall, in ordinary reſpirations.

But beſides this miſtake, as to the final cauſe of extraordinary reſpiration, ſome confuſion of ideas has prevailed as to the means employed in Aſthma. The inſtruments which nature can alone call into action when the lungs are injured or oppreſſed, are the muſcles which act externally in expanding or compreſſing their cavities, for the purpoſe of inſpiring or expiring air.

The convulſions are therefore external to the lungs as far as any appear. It is not, however, wonderful, that a miſtake ſhould have occurred as to the proper inſtruments of relief, ſince almoſt all the motions called *ſpontaneous*, are performed without our conſciouſneſs; in ſome, not only the muſcles employed, but the effects of their actions are unknown.

The muſcles of reſpiration are ſuſceptible of ſpontaneous actions, and the conſtant repetition of ſuch actions introduces paroxyſms, frequently without a perceptible interval between their exceſs and common ſtandard. When the exceſs becomes conſiderable it brings on aſſociated contractions of other muſcles, and the irritation, which they are to diſcharge from the cavities of the breaſt or abdomen, is ſo acutely felt as to turn the patient's attention entirely to the ſeat of the cauſe. There may be the additional cauſe of this ſenſation in conſtrictions of the bronchia correſponding with the external contractions, but of this ſtate there has yet been no proof.

The ſubject is illuſtrated ſtill more by adverting to an irritation in the inteſtinum rectum. All the attention of the patient is then turned to the excruciating teneſmus, but it is indiſputable that the violent periſtaltic action above the rectum, and the ſtrong contractions of the abdominal muſcles and the diaphragm, are the inſtruments to evacuate the offence, and alſo moſt materially occaſion or increaſe the pain in the portion where it reſts.

In the diſcharge of urine the chief perception is in the bladder, but if the muſcles which we have mentioned to act in expelling feces, did not contract with great effort, the perception could not be ſo ſtrong, as the propelling the contents of the bladder towards its neck muſt precede the relaxation of the ſphincter. Yet the attention of the animal reſts upon the effect, and the particular ſeat of the cauſe of theſe efforts, although no motion be at preſent performed by the bladder. Afterwards by the uniform and ſteady contraction of its own muſcular coat the urine is expelled.*

Exactly this degree of perception of ſtimulus incites the actions of the reſpiratory muſcles when the lungs are to be relieved. And the mind ſeems to have the ſame degree of conſciouſneſs of the effect to be produced whenever the irritation may be ſaid to create *anxiety* and *ſtricture about the ſternum*.

We have hitherto ſuppoſed that the irritating cauſe of Aſthma may chiefly reſt in the lungs, but the definition of this diſeaſe implies that it may alſo exiſt in ſome of the abdominal viſcera : a poſition which may be defended by the moſt certain principles of phyſiology, and which I hope to eſtabliſh in the progreſs of this inquiry.

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* Monro on the Nervous Syſtem, Chap. XXVIII.

The contractions of the reſpiratory muſcles are really *Motus Medicati*, as Gaubius frequently terms them in beautiful and juſt deſcription.

"Multifariæ autem, quibus corpus vivum pollet, "vires motrices, quum rebus nocivis irritatæ ſemet "exſerunt, præcipuum præſtant vitæ ac ſanitati "præſidium.—Inde profluunt motus automatici, "irregulares quidem multimodis, at ſæpe beneficentiſſimi, certaque determinatione ad ſalutarem "finem tendentes; etiamſi mente nec imperante, "nec conſcia, et vel invita quoque, fiant, hujuſque "adeo conſilio nequaquam tribui poſſint. His ſi "careret homo, nulla vel ſanitati conſtantia, vel "morbo medela foret."*

For the further advance of this object of reſtoring health or averting evil, ſympathies are eſtabliſhed in the œconomy, which rapidly excite a unity of effort in muſcles, primarily calculated for ſeparate duties. "Accedit partium facultatumque conſenſus ac conſpiratio qua mutuam "ſibi opem ferunt, aliæ aliarum vice funguntur, "ſanæque pro afflictis in motus medicatos ruunt; "ut horum junctis viribus tanto minus reſiſtere "imminens præſenſve morbus poſſit."†

It is very convincing that the muſcles of reſpiration may be ſo habituated to the operations of this ſympathy, as to contract from various and apparently diſſimilar ſpecies of ſtimulus. The diaphragm and abdominal muſcles naturally ſupport three functions, viz: of *reſpiration*, and of evacuations from the *inteſtines* and *bladder*. They are then the common inſtruments of relief to theſe three functions when diſturbed by too much irritation. Such a communication creates ſome alliance between them and other muſcles which are not common to the three functions, but which are rather appropriated to the ſeparate duty of ſerving one.

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* Gaubii Inſtit. Patholog. Medicin. 640.

† Gaubii Inſtit. Patholog. Medicin. 642.

A repetition of contractions produces the habit and facility with which theſe muſcles, from an irritation in any one of the three ſyſtems, unhappily proceed to involuntary exceſs of effort, influencing at once, reſpiration, digeſtion, and urinary excretion.

SECT. II.

The nature of the Irritation *in Aſthma ; frequently manifeſt ; ſometimes obſcure.—The* continued Aſthma *of Floyer from* manifeſt Irritation.—*Caſes of irritation producing Aſthma, aſſented to by medical authorities from their evident offence.*

IN ſome caſes of exceſſive reſpiratory labour the nature of the irritation is diſcovered by ſymptoms which admit of no ambiguous pathology, in many others phyſicians have declared their doubts, by reſorting to conjecture and theory, which have been ingeniouſly built on the baſis of hypotheſis, but which experiment has not yet confirmed, nor diſſection ever defended.

The caſes of manifeſt material irritation are enumerated by Dr. Floyer as one ſpecies of the Aſthma, which he calls *continued.* He conſiders it as dependent on a primary diſeaſe, which muſt be removed before the Aſthma will ſubmit.

In my opinion, his cauſes of the continued Aſthma ſtrongly ſupport the following propoſition, that, "*the exceſſive contractions of the muſcles of* "*reſpiration indicate an injury or irritation in ſome* "*organ which thoſe muſcles ſerve.*"

For this reaſon a general view may be taken of ſuch manifeſt and undeniable irritations as have been obſerved by practical authors, before we purſue the other parts of the ſubject.

Hydrothorax occaſions Aſthma by the external compreſſion of the air veſſels of the lungs,* and it is alſo too often the conſequence of Aſthma, when that diſeaſe is inveterate. Vide Carol. Piſo de Morbis ex ſero. p. 217.—Baglivi Praxis p. 107.—Goodwin on animal life and reſpiration, where is an example of this cauſe of Aſthma, artificially produced. Alſo Boneti Sepulchret. Anatom. tom. I. p. 515, 516, et inſequent.—Mr. Cruikſhank on the abſorbent ſyſtem, p. 116.—Morgagni, Lib. 2, Epiſt. xvi.

Similar to this cauſe of Dyſpnœa is the Hydrops Pericardii. Morgagni, Lib. 2, Epiſt. xvi.

An Empyema, abceſs, or large tubercle: ſteatomatous tumor, &c. in the ſubſtance of the lungs or on their inveſting membranes.

Vide Jacob Wepſer, exerc. de apoplexia. Boneti Sepulchret. Anatom. Mangeti. tom. I. p. 352, 353, 498, 499, 500, &c.—Columbus Lib. xv.—Car. Piſo de morbis a ſero, ſect. 3, Cap. 4.—Baillie's morbid anatomy, p. 46, et inſeq.

In the inſtance of a vomica† there is no diſtinction to be obſerved, between the manner in which nature attempts to eject it from the lungs, and the efforts which ſhe uſes to diſcharge the irritating cauſe of ſpaſmodic Aſthma. T. W. has been ſeized with theſe ſymptoms at the approach of two ſucceſſive winters, and they terminated by the rupture of a vomica, which in the firſt illneſs was many weeks before it broke, in the ſecond not ſo long, nor was the diſcharge ſo large; in the interval he was in his uſual health.

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* Vide Haller, ad Boerhaav. Prælect. §. 102. not. 17.

† Tulpii obſervat. med. lib. 2. cap. x.—Jodoci Lommii Medicin. obſervat. lib. 2. Hippocrat. lib. 4. epid. 6—4.

The difficulty of breathing commenced after expoſure to violent heat, and the vapour of aquafortis in refining gold; a ſlight cough, but interrupted and uſeleſs, attended the dyſpnœa; in a few days he perceived an increaſe of dyſpnœa, and great flatulence of the ſtomach, then a paroxyſm of laborious reſpiration preventing the continuance of ſleep, returned every night with the regularity of periodic Aſthma, from which an ordinary obſerver could not in the leaſt diſtinguiſh the diſeaſe, though the difference might be found by attention to collateral ſymptoms; the pulſe was full and hard as in other inflammations, and a pain not pungent but oppreſſive was felt where the diſeaſe lay. In the progreſs of the diſorder the expectoration of fetid pus in large quantity declared the nature of the inconvenience which irritated the lungs.

Bartholine* gives a very fortunate inſtance of the cure of a ſecret vomica, exciting Aſthma, and wearing away the body. The patient was wounded by a ſword, the point of which paſſed between the ribs and opened the ſac. The effuſion of pus was attended to, and the patient was reſtored to health.

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* Hiſtor. Anat. 14. Centur. 6. vide Fernelius Patholog. Lib. v. Cap. x.

A brave officer was ſhot through the lungs at the battle of Quebec, and was cured of his wound, and an Aſthma at the ſame time. It is probable ſome organic derangement was removed as in the caſe related by Bartholine.

Polypous concretions in the ventricles of the heart, and pulmonic veſſels, are conſidered by Hoffman as a frequent occaſion of difficulties of breathing. In his Conſultations he appears to extend the influence of this ſtate much farther than the general reſult of Aſthmatic Paroxyſms will juſtify. However, diſſections have proved that this condition often prevailed, but in ſome inſtances, if not in all, it may be ſuſpected to have been rather the conſequence than the cauſe of Aſthma. See Tulpius lib. 1. cap. 27.—Riverius Centur. I. obſ. 82.—Bartholin de Lact. Thoracic. cap. xiv.—Malpighius de polypo diſſertat.—Bonetus* tom. 1. p. 128, 130, 527, 528, et inſeq. Willis de Affect. Hyſtericis et Hypochondriacis.—Morgagni Epiſt. xv. xvii. xxiv. xxvi.

Aneuriſmal enlargements of the heart and of the aorta; oſſifications, earthy depoſitions and alterations of its ſtructure, are treated of in Dr. Baillie's morbid anatomy of the human body. Morgagni Epiſt. xvii. xxiv. xxvi.

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* Bonetus Mangeti, Lugduni, 1700.

Calculous concretions in the trachea, and in the ſubſtance of the lungs have been met with; alſo earthy and bony ſubſtances.—Baillie's morbid anatomy, chap. iv.—Morgagni lib. ii. Epiſt. xv. et inſeq. Epiſt. xxiv.—Diemerbroeck Anatom. lib. ii. p. 443.—Bartholin. Anatom. reform. l. 2. c. 9.—Kerkringius Obſ. Anat. xxvii.—Boneti Sepulch. Anatom. tom. 1. p. 485, 501, 502.—Fabric. Hildanus, Cent. ii. Obſerv. 29.—Miſcell. Curioſ. Anni. 1671, Obſerv. 181. In this latter inſtance there is the remarkable aſſertion that reſpiration was not affected. Platerus Pract. lib. i. ſect. 2. c. 4.—Schenkius Obſ. Med. rar. lib. 2.—Boerhaave Prælect. in Inſtit. § 835.—Morton. Phthiſiolog. lib. 3. cap. 6.

Bones and other hard ſubſtances have paſſed down the trachea, and created certain Aſthma. Tulpii Obſ. lib. 2. cap. 7.

Concretions have been coughed up of different kinds, ſo large as to create aſtoniſhment in the relaters. Koehlerus* ſpeaks of them as very large. Morgagni ſaw one expelled by cough as big as a peach ſtone. Œthæus† deſcribes one as large as a walnut coughed up by a girl of fourteen.

Carcinomatous tumours have been diſſected from the trachea. Bonet. Sepulch. Anat. Tom. i. p. 485.

Oſſifications of the pleura, vide Baillie's Morbid Anat. p. 40.

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* Commerc. Litter. A. 1741.

† Vide Schenkius ad loc. cit.

The rings of the trachea have become more or leſs oſſified, the cartilage being converted into bone. In this caſe, ſays Dr. Baillie, "the mucus will not be ſo readily expelled by coughing, as the expirations cannot be ſo forcible."* See Morgagni, Epiſt. xv.—Tumours in the trachea have been often remarked.

Fat or a tumour of the thymus gland. The thymus has been known in ſome inſtances not to diminiſh as the ſubject advanced in years; in others it has even encreaſed from diſeaſe.—Boneti Sepulch. Anatom. tom. 1. p. 486, 504.—Baillie's Morbid Anatomy, p. 73.

Gibboſity is a well known cauſe of difficult reſpiration. This irritation being permanently and rigidly fixed, either in the ſternum or ſpine, the diſeaſe is inveterate as the cauſe.† Lommius‡ ſays, if a perſon become gibbous before puberty in conſequence of Aſthma, he dies; in which he follows the prognoſtic of Hippocrates Aphor. 46. ſect. 6. but it is highly probable that Aſthma may be the conſequence of the gibboſity, or at leaſt of an alteration in the ſtructure of the ſpine or ſternum, which may diſturb the function of the lungs in ſeveral ways, before it be obſerved and acquire the term of gibbous. Theſe authors have in that caſe ſubſtituted cauſe for effect.*

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* Morbid Anatomy, p. 59.

† Mr. Cheſher, of Hinkley, in Leiceſterſhire, by the adoption of juſt principles, and the moſt careful practical deductions from his obſervations and experience, has attained aſtoniſhing ſucceſs in treating many hopeleſs caſes of gibboſity.

‡ Jodoci Lommii Obſ. Med. lib. 2. p. 140. Millar on the Aſthma, p. 114. Gliſſon de Rachitide.

An ulcer in the ſternum from a removal of an excreſcence, has been followed by Aſthma. See Hoffman de Aſthmate et Conſult. et Reſp. Med. Hildanus Cent. 6. Obſ. 74.

Adheſions of the lungs to the diaphragm, pleura and pericardium have been frequently found by diſſection; theſe are conſequent to inflammation, and it is obvious that Aſthma may attend this organic alteration. Bonetus tom. i. p. 509, 512.—Bontius Med. Indor. Obſerv. vii.—Willis Pharm. Rat. part. 2, ſect. 1, c. 8.—Hippocrat. lib. 2. de morbis pulmon, &c. Morgagni Epiſt. xvi.

Theſe adheſions are ſaid by Diembroeck to be found in one third of the ſubjects opened. Tulpius affirms that the lungs in very few bodies are entirely free from ſuch appearances.

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* The aphoriſm of Hippocrates creates conſiderable confuſion in its ordinary interpretation. — Severinus (lib. de Abſceſſibus), propoſes a reading which clears the difficulty and makes the ſenſe more conſiſtent with the opinion above delivered, and with the probable meaning of Hippocrates. For ἔξ read ἔξω and the paſſage will ſtand thus, ὀκόσοισι ὕϐοι ἔξω ἄσθματος, ἢ βηχὸς γίνονται, &c. εξω ſignifies *præter* as well as *extra*. The ſenſe will then be, “ qui præter anhelationem et tuſſim gibbi quoque fiunt, eos ante pubertatem mori.” See Bonet. de Gibboſitate.

The ſtraining of the lungs by running is mentioned by Floyer, by which injury may happen to the membranes or fibres in the interſtices of the air cells.

Flatus in the colon and ſtomach are ſeldom abſent in the ſpaſmodic Aſthma, and if ſuch a ſtate of thoſe viſcera be attended with continued dyſpnœa, the diſeaſe can only be accounted a variety of the other ſpecies, in which it will appear that the periods of intermiſſion are very uncertain, and ſometimes loſt in the advanced ſtages of the complaint, or when it is complicated.

Tumours of the lower viſcera, ſchirrous hydropic, ſteatomatous, or flatulent, produce Aſthma by exciting an exceſſive action of the thoracic and abdominal muſcles, intended to aſſiſt the functions which they diſtreſs. Inſtances are numerous in practical authors of the inconvenience of ſuch cauſes. The gravid uterus is a very general occaſion. Aſcites and Tympanites produce the ſame effect. Dr. Ferrier* has a curious inſtance of tympanites, in which the omentum was found lying in a ſac formed in the diaphragm, on the right ſide of the thorax; Aſthma was an inevitable ſymptom of ſuch a ſituation of the viſcera.

Fat and ſteatomatous tumours have adhered to the diaphragm.—Vide Veſlingius Syntagma. Anat. cap. 9.—Kerkringius Obſ. Anatom. 89.

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* Med. hiſt. and reflect. vol. i. p. 41.

And alſo to the pleura and mediaſtinum. Boneti tom. i. p. 533, et inſeq.

The liver has been found of an enormous ſize by many practitioners. Bonet. tom. i. p. 537, et inſeq. And Aſthma is very frequently ſymptomatic of the diſeaſes of this viſcus and of the ſpleen.

The diſeaſes of the meſentery and omentum, eſpecially if they give occaſion to an altered ſtate of the liver and ſtomach are cauſes of Aſthma. Joh. Rhodius Cent. 2. Obſerv. 25.—Guern. Rolfinkius Diſſert. Anat. lib. 1. cap. 13.

The liver has been united by adheſion to the diaphragm and lungs. Diemerbroeck Anat. lib. 1. c. 13.

An hydropic patient was opened in my preſence, and the liver was found to contain a large ſac of hydatids, which was connected by adheſion to the ductus communis; before this perſon ſwelled in the abdomen, he had been for ſome time aſthmatic, and the bile was not paſſed regularly into the duodenum. Flatulence of the ſtomach was predominant, and the diſeaſe appeared to wear moſt of the ſymptoms of ſpaſmodic Aſthma. Worms have been found by anatomiſts in different ſituations in this viſcus.*

The abſorbent glands in the poſterior mediaſtinum are ſubject to enlargement from ſcrofula. When this affection is conſiderable it neceſſarily produces ſome difficulty of breathing by preſſure on the lungs and trachea.[*] The ſame glands near the trachea occaſionally are converted into bony or earthy matter, and preſs the paſſage.[†]

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* Vide Lieutaud tom. i. p. 194.

Diemerbroeck[‡] relates that he ſaw a live worm coughed up from the lungs of a woman; and that he had obſerved theſe animals by diſſection in the veſiculæ of the lungs. He infers that they muſt have been bred in theſe cells, for if they had inhabited the bronchia ſuffocation would have been the conſequence, and the moſt violent cough and Aſthma. If they had been inhabitants of the cells at the extremities of the bronchia, it muſt be believed that Aſthma would have been equally inevitable, though perhaps not ſo acute.

Aſthma has certainly proceeded from hydatids in the ſubſtance of the lungs, on the pleura, diaphragm, and even the ſurface of the heart. The ſudden rupture of theſe hydatids has produced immediate ſuffocation.[§]—Car. Piſo de morbis a ſero ſect. 3. cap. 7.—Boneti Sepulchret. Anat. tom. i. p. 498, 499.

For a curious caſe of the dilatation of the lower part of the pharynx by which a pouch was gradually formed, ſtopping the paſſage of the œſophagus, ſee Med. Obſervat. vol. 3. p. 85.

Baillie's morbid anatomy, p. 71.

[†] Baillie's morbid anatomy, p. 72.

Lib. ii. p. 442.

[§] Vide Ottonem Heurnium obs. 18.—Bartholinum, Cent. iii. obs. 61.

The ſternum and the cartilaginous ends of the ribs have become oſſeous, and not under the controul of the muſcles of inſpiration. Bonet. tom. i. p. 533, and Platerus Praxis. lib. i. cap. 4. Here is a caſe of Aſthma analogous to any other form of gibboſity.

The mal-formation of the enſiforme cartilage, by being turned inwards as if artificially depreſſed, is productive of hepatitis and chronic affections of the ſtomach, and alſo of Aſthma. Diemerbroeck has particularly noticed the inconveniencies from this cauſe. Lib. 9. cap. xiv.

Bartholine* alledges the effuſion of chyle to be a cauſe of aſthmatic affection, in this caſe he ſuppoſes the rupture of a duct.

An extreme dryneſs of the parenchyma of the lungs has been well aſcertained. Rhodius† aſſerts that it has been occaſioned by the profuſe uſe of the decoction of guaiacum wood. Avicenna had remarked ſuch a condition to ariſe from the hot vapour of furnaces and metallic fuſions.

Heurnius‡ ſaw the lungs of a printer ſo altered as to almoſt appear like a dried apple.

Conſiderable deficiencies of ſubſtance have been diſcovered by diſſection in the pulmonary ſyſtem.

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* Speciieg. 2. de Vaſis Lymph. cap. 2.

† Cent. ii. Obſ. xxi.

* De Morb. Pectoris. Cap. iv.

Vide Senac Traité du Coeur, l. iv. c. 3.—Haller's Opuſcul. Patholog. Obſ. 17.

The mediaſtinum, and even the diaphragm with a large portion of the lungs, have been wanting. Diemerbroeck Anatom. l. i. c. 13. This defect was imperfectly ſupplied by adheſion of the liver to the only lobe of the lungs which appeared, and the ſubject arrived at his ſeventh year.

The account of the diſſection communicated by the phyſician D. Waſſenaer to Diemerbroeck himſelf, would have been more ſatisfactory if the natural hiſtory of the boy had been more particularly detailed. We are only told that he was aſthmatic all his life, and haraſſed by violent and frequent cough from the ſlighteſt cauſes; a ſlow fever at length terminated his ſufferings.

The conformation of this ſubject was not leſs curious than that of the celebrated blue boy, whoſe caſe is given by Dr. Sandifort.* Here the aorta aroſe from the right ventricle as well as the left; the pulmonary artery was ſcarcely pervious to a ſmall probe, and the difficulty of paſſing it from the heart to the lungs was greater than in the contrary direction. This patient was aſthmatical from the ſecond year of his life, which was extended in a miſerable ſeries of ſufferings to 12 years and a few months.

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* Vide Obſervat. Anatomico-Patholog. Lugd. Batav. 1777, p. 11, alſo the Remarks of Dr. Beddoes. Obſervat. on Calculus, &c. p. 63, et inſeq.

The circulation through the lungs impeded by any organic mal-formation, muſt be productive of Aſthma; and it appears that if the current be diverted from the courſe of pulmonary circulation, the ſame effect, in greater or leſs degree, muſt happen. Haller ſays, that the arterious duct is found pervious in the ſecond year, and the foramen ovale has been open longer by his own obſervation.*

Bartholine† obſerved the foramen ovale open in *adults* more than once.

Morgagni relates the hiſtory of a virgin ſubject who attained her ſixteenth year. She had been ſickly from her birth, and affected with extreme weakneſs; her reſpiration difficult, and her whole ſkin of a livid colour. The foramen ovale was found ſo wide as to admit the little finger.‡

In theſe inſtances the blood cannot be expoſed to the influence of the air inſpired.

The heart muſt therefore be too little ſtimulated, and the black blood in its cavities will give anxiety, and irritate the muſcles of reſpiration.

Miners are ſaid by Sennertus§ to have been opened in whoſe lungs metals were found of the kind in which their operations lay. Horſtius confirms the bad effects ſaid to proceed from the metallic fumes to which artiſts are expoſed, but fancifully aſſerts, that ſuch complaints are only to be remedied by mineral medicines. See Sennertus Pract. lib. ii. p. 2. cap. 2.—Bartholin. Cent. 4. cu. Theod. Schenkius, Epiſt. 72.

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* Haller, tom. iii. 161, 162.

† Anatom. Reformat. lib. ii. cap. 8.

‡ Morgagni de Cauſis, &c. Epiſt. xvi.

§ De Conſ. et Diſſenſu, cap. ix. vide Horſtius, Obſ. l. 7. Obſ. 25.

Stone cutters and cleaners of feathers receive the matter which is ſuſpended in the air into their lungs, and become Aſthmatic. Diemerbroeck, lib. ii. p. 443.

According to Sylvius,[*] the parenchyma of the lungs is ſometimes denſe and corrugated, occaſioning dyſpnœa. He attributes this ſtate to the reſtringent quality of the blood, but it may be aſſigned with more reaſon, to preceding inflammation.

Hoffman deſcribes the veſicles in this diſeaſe, "Quaſi carnea, craſſa, rubicunda, ſubſtantia, "infarctas."

Morgagni[†] ſays, the matter filling the lungs is like the ſubſtance of the liver, and Senac[‡] confirms this deſcription.

Dr. Baillie adds his teſtimony to the fact. He ſays, "The ſubſtance of the lungs has in this "diſeaſe nearly the ſame ſolidity, and the ſame "general appearance as the liver. When exa"mined more minutely the air cells appear to be "filled with a browniſh ſolid matter."[§]

Flatus have been ſaid to diſtend the lungs, being carried there by the lacteals, &c. See Reg.

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[*] Sylvius de la Boe. Praxis. lib. i. cap. 22. § 17, 18.

[†] De Sedibus, &c. Epiſt. xxi.

[‡] Traite du Cœur. l. iv. ch. 3.

[§] Morbid Anatomy, p. 52.

de Graaf de Succo Pancreatico, cap. 9. and alſo Floyer paſſim. A nobleman, ſays Rhodius,[*] died of a diarrhæa cum ſuſpirio. The lungs were ſo ſwelled with wind as to fill the whole cavity of the breaſt.

Sylvius[†] aſſures us that flatus make their way every where. And Mr. J. Hunter[‡] coincides in his opinion, as we may preſume from his account of the exploſions from the vagina. Notwithſtanding theſe authorities, it may perhaps be moſt prudent to believe, that the blood contains no detached maſſes of air.

The lungs are ſuſceptible of a diſeaſed growth, of which inſtances are well aſcertained.[§]

I opened the thorax of an hydropic patient, and found his lungs of a monſtrous ſize, very pale, and free from any other diſeaſe. The heart was, however, loaded with exceſſive fat; and theſe organs ſeemed to have robbed the liver of its nouriſhment, for that viſcus was particularly ſmall. The patient had laboured under dyſpnœa for many years.

The ſuppreſſion of evacuations of blood, as the menſtrual or hæmorrhoidal flux; by which the lungs are neceſſarily oppreſt with the redundant fluid. See Floyer, p. 96.—Hoffman Conſult. and Reſpon. Cent. i.—The difficulty of breathing, from this cauſe, is more entitled to the name of dyſpnœa, and may precede either Aſthma or Phthiſis. Vid. Schneiderus de catarrh. lib. iii. c. 6.

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[*] Obſervat. xxii. Cent. ii.

[†] Lib. ii. Cap. 21. § 19.

[‡] See Animal Œconomy. The phœnomenon aſſerted by the ingenious anatomiſt is very plainly deſcribed by Sylvius (loc. citat.) Flatus.—“Obſervantur quoque excludi per Urethram; ſic qui ad Uterum ſunt delati, “aut in ipſo geniti per ipſius cervicem utramque obſervantur erumpere, “atque foras exitum invenire!”

[§] Sylvius Praxis, lib. i, cap. 24. ſect. 12.

Exanthemata repelled are a cauſe of Aſthma, aſſented to by practitioners; there is no difficulty in ſuppoſing that the matter of thoſe herpetic eruptions, which were manifeſt to the ſenſes when ſeated on the external ſkin, may be depoſited on the lungs or their inveſting membranes, when the external diſeaſe has ſuddenly diſappeared. The ſame obſervation applies to other eruptions, whether attended by pyrexia or not. Phthiſis follows their repulſion as well as Aſthma. See Floyer, p. 100.

An inſtance of relief from the eruption of ſmall tumours which appeared externally, is recorded by Dr. Stark. Clin. et Anatom. Obſerv. p. 44.

Similar to this cauſe of Aſthma, the gout atonic or retrocedent may create that affection, and frequently does. See Hoffman de Aſthmate, et Conſult. et Reſp. Med. Cent. 1.

A viſcid mucus ſecreted by the glands of the trachea and bronchia, and loading their follicles, neceſſarily impedes the free admiſſion of air, and irritates the organ. This ſpecies of Aſthma approaches by imperceptible ſhades of diſtinction to the character of periodic convulſive Aſthma, but as depending on a cauſe which is ſufficiently manifeſt to have received the aſſent of medical obſervers, it is claſſed with other caſes of the continued or ſymptomatic Aſthma of Floyer, or Dyſpnœa of Cullen. The latter writer called it Dyſpnœa Catarrhalis, and Hoffman Aſthma Pituitoſum, vide Tom. iii. Sect. ii. cap. ii. § 3. Alſo Willis Pharm. Rat. p. 2. Sect. i. cap. 12.

Polypi of tenacious matter have been the occaſion of Aſthma when the air veſſels were filled with this ſubſtance. Secretions of this kind induced ſome writers to ſpeak of vaſcular tubes being diſcharged, but the caſe has been explained with great diſtinctneſs by Dr. Warren in the firſt Volume of Tranſactions of the College of Phyſicians. Art. xvi. of the Bronchial Polypus.

A more particular account may be obtained of derangements of the thoracic and abdominal viſcera, leading to or inducing difficulties of breathing, by conſulting Morgagni and Bonetus.

There are alſo numerous detached facts in the different journals, foreign and domeſtic, which ſupport the ſame concluſion.

Theſe cauſes have been aſſented to as inducing Aſthma by obſtructing the action of the lungs or diaphragm.

They muſt however be conſidered as *irritations* exciting the reſpiratory muſcles to relieve the organs in which they were ſeated.

SECT. III.

Dyſpnœa of Dr. Cullen comprizes caſes of continued Aſthma of Floyer.—Under this name the diſeaſe preſerves its character in a milder form.—Anhelation an acute caſe of Dyſpnœa, proceeding from violent or rapid exerciſe.—The muſcles of locomotion and reſpiration do not readily encreaſe their actions at the ſame time.

DR. Cullen cloſely follows Sir J. Floyer in the idiopathic ſpecies of Aſthma, but deſerts him in his *continued ſpecies* or ſymptomatic Aſthma, by excluding moſt of the caſes of this ſpecies from the genus Aſthma, and placing them, with many others, under the genus Dyſpnœa: but a new name will not alter the arrangements of the animal œconomy, nor diſguiſe the appearances of nature in her diſtreſs.

In dyſpnœa, the ſpecies ſtill depend on ſome cauſe which irritates an organ by its obſtruction or acrimony. Under that head in the noſology the cauſe frequently is made to diſtinguiſh the varieties by a trivial addition, ſhewing the impropriety of attributing degrees of the ſame affection to eſſentially diſtinct origins.

Whenever there is a difficulty of breathing there is an exceſs of reſpiratory actions occaſioned by irritation, the force of which may be probably compounded of quantity and quality, in degrees not always to be aſcertained ;* ſtill we muſt not forget that " Majus aut minus non variat ſpeciem."

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* Noſol. Method. G. iv. and L. vi.

Dyſpnœa is conſidered by Hoffman as tranſitory and without danger.† It attends commonly on the corpulent, fat and plethoric, who feel it moſt when the body is put in motion.

In ſuch ſubjects the ſtructure of the lungs being lax, and the contractions of the pulmonary artery weak, the blood paſſes with difficulty to the left ſide of the heart, occaſioning a compreſſion of the air veſſels.

If in this ſtate the circulation be accelerated by an accidental cauſe, the accumulation in the pulmonary veſſels will be intolerable, yet as they are not thin and tender, but dilatable, rupture may not take place.

It has already been ſtated that ſuppreſſions of cuſtomary evacuations of blood, materially lead to this condition of the veſſels of the lungs.

That ſuffocative ſenſation which is brought on by rapid exerciſe is a more acute caſe of Dyſpnœa, called by noſologiſts *Anhelation.* Its immediate cauſe is ſimilar, though the remote ones had not been applied.

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* The cauſe is here ſuppoſed to be applied to a habit in which the ſtandard of nervous ſenſibility is moderate and common to ſubjects not advanced far in the diſeaſe. Accumulated irritability produces, or is attended by, increaſed ſenſibility to ſtimuli ; and habits of morbid contractions of muſcles are a diſorder when the primary irritation is removed.

† Opera tom. 3. Sect. 3. cap. 2. § 3. Willis Pharm. Rat. Part II. Sect. 1. cap. 2.

When a perſon is ſaid to be "*out of breath*" from violent exertion, the blood has been accelerated from all parts of the body to the heart, that organ is ſtimulated to diſcharge it through the lungs to the left ſide, and its contractions are quick in proportion to the frequency with which this ſtimulus is renewed. Inſpirations of air are then eagerly attempted, but the exertions of the locomotive muſcles ſeem to check thoſe of the muſcles of inſpiration; and to prevent the reſpirations being encreaſed in the cuſtomary proportion to the pulſations of the heart and arteries. If 70 pulſations be uſually accompanied by 18 reſpirations, 140 pulſations ſhould be attended by 36 reſpirations, but it is certain that this balance is loſt in violent exerciſe.

When the action of the locomotive muſcles is ſuſpended, that of the reſpiratory muſcles is encreaſed, and the blood being more readily paſſed through the lungs, becauſe the organ is more perfectly expanded, a ſenſe of ſuffocative irritation is removed.

Haller† points out this irritation as the efficient cauſe of the whole proceſs of reſpiration in a moderate and natural degree, but if a ſenſe of ſuffocation originally excited the act of breathing, and if that function continue to be ſupported through the habitual, and therefore imperceptible operation of the ſame cauſe, the extreme caſe of too violent a repletion of the veſſels may be well ſuppoſed to excite a proportionate action of the reſpiratory muſcles for the ſame end.

This diſtreſs from violent exerciſe is however moſt oppreſſive to thoſe who have not been in the uſe of it, for habit will not only enable a perſon to act with his locomotive muſcles with greater vigour, but to accompany their exertion with more reſpiratory action than in others who have not purſued it. In theſe alſo the veſſels will not be ſo ſubject to partial dilatation, and the fluids contained will be more equally diſpoſed of through the ſuperficial capillaries of the body: but where is the inſtance to be found of education or habit having entirely overcome the influence and conſequence of ſome irritation from this cauſe?

SECT. IV.

The progreſs made in this inquiry.—Aſthma from irritation *not ſo apparent as in the continued ſpecies.—The* PERIODIC FLATULENT *of Floyer; the* SPASMODIC ASTHMA *of Cullen.—The diſeaſe deſcribed.—Its proximate cauſe inveſtigated.—The path which was followed in the inquiry after the cauſe of the continued ſpecies purſued in treating of this.—Symptoms and indications generally the ſame.—Sir John Floyer's caſe.*

IT has been ſhewn that the violent contractions of the reſpiratory muſcles may be excited by the irritation of ſome organ which theſe muſcles ſerve.

The diſorder of reſpiration has even been traced both in Dyſpnœa and Aſthma to a material, which could not fail, by its offending properties, to occaſion it. In many inſtances of ſucceſsful effort to eject this material, the reſpiratory labour has ceaſed, nor would it ever continue after the cauſe was removed, but from ſecondary inconveniencies which are referable ſometimes to the laws of muſcular aſſociation and habit, at others to the alteration of ſtructure which it may have occaſioned in ſome organ.

But there is a diſtinction made by *Sir John Floyer by which he ſeparates the affection occaſioned by a manifeſt inherent cauſe, from that whoſe cauſe is not ſo obvious. The latter he calls "the Periodic flatulent Aſthma." [*]Willis terms it "Aſthma Convulſivum." [†]Hoffman and [‡]Cullen, Convulſivum et Spaſmodico-flatulentum, or, Spaſmodic Aſthma.

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* Floyer, chap. 1.

The laſt author places three idiopathic ſpecies under this genus, of which the firſt is *ſpontaneous* "ſine cauſa manifeſta vel alio morbo commitante." The ſecond is *Aſthma Exanthematicum*, which may be properly claſſed with other caſes already noticed under the Dyſpnœa of Cullen, and the Continued Species of Floyer.—The *Aſthma Plethoricum* ariſes from a ſuppreſſion of uſual evacuations of blood, or from a ſpontaneous plethora. It is true that ſuch a ſtate of the pulmonary veſſels may exiſt, as, by compreſſing the veſiculæ and bronchia, may prevent their perfect expanſion, but I have taken the liberty of calling ſuch affection Dyſpnœa, or a ſlight Aſthma, becauſe, unleſs it produce effuſion of ſerum from the exhalents, it does not periodically excite the convulſive paroxyſm.

The attack of a paroxyſm of *Periodic or Convulſive Aſthma* is preceded very generally by Dyſpepſia, and the circumſtances which occur to a relaxed habit. This condition of the body may have prevailed for months or years before it aſſumes the additional form of Aſthma, but when that diſeaſe appears, Dyſpepſia never fails to be aggravated, and to ſhew itſelf with violence before the fit. The ſymptoms are flatulence and diſtention of the ſtomach and bowels; a heavy pain over the forehead and eyes; eructation of wind, with water which is ſometimes inſipid, at others ſour. When the evening approaches this weight over the eyes becomes more oppreſſive, and the patient is very ſleepy. Occaſionally, if particularly animated by company and converſation, the drowſineſs does not take place, but a ſhortneſs of breath is perceived, and ſoon after much anxiety of the præcordia, with great reſtleſsneſs. The preſence of company then becomes irkſome, as it ſeems to increaſe a certain heat of the body, a want of free reſpiration, and an irritability which repels the moſt cautious attentions of friends. Frequently at this period there is a tingling and heat in the ears, neck, and breaſt, and a motion to expel the contents of the bowels is attempted vith ſome violence, and with great uneaſineſs of the abdominal muſcles. When an aſthmatic feels theſe warnings he may be convinced that his enemy is at hand.

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[*] Willis Pharm. Rat. p. ii. ſect. i. cap. 12.

[†] Hoffman, iii. 94.

[‡] Noſolog. Method. G. lv. Practice of Phyſic, MCCCLXXIII.

At ſome uncertain hour before midnight the patient is ſenſible of the violence of the diſorder; moſt frequently after a ſlumber in bed he awakes with great difficulty of breathing, and feels the neceſſity of a more erect poſture of his body. Inſpiration is performed with great effort of the muſcles, but is never perfectly deep, and the diaphragm ſeems to deſcend with great difficulty againſt an oppoſing force.

There is now a deſire of free air, ſpeaking becomes diſtreſſing, and the irritability of the mind continues, but is not ſo acute as in the approach of the fit. There is great ſtraitneſs of the cheſt, and a wheezing ſound in reſpiration. An inclination to cough ſhews itſelf, but this is ſmall and interrupted. The pulſe is increaſed in quickneſs a few ſtrokes, but without hardneſs. There is no preternatural thirſt, unleſs, as often happens, the fit be excited by indigeſtible matter in the firſt paſſages. There is a propenſity to make water, which is copious and pale, and frequently diſcharged.

After ſome hours of diſtreſs the patient perceives his anxiety to be leſs, the breathing is leſs quick and laborious, the inſpirations are longer and more full, the expirations ſtill attended with wheezing; the pulſe is not ſo quick, but more full, irritation leſs acute. The cough probably brings up a portion of phlegm, and a very ſenſible relief follows that excretion. Then the tranquil ſtate of the feelings introduces ſleep, but not unaccompanied by wheezing, which continues almoſt always through the firſt night, and until, by the progreſs of the fit on the ſecond or third day, a more conſiderable expectoration of mucus takes place.

The ſecond day is uſhered in by a remiſſion of the ſymptoms which the patient perceives from the time of awaking in the morning. No change of poſture is, however, yet made with impunity, and particular diſtreſs will affect him, if he engage in the fatigue of dreſſing, whilſt the ſtomach is empty. The pulſe will be accelerated more than it was in the acmé of the paroxyſm, and motion muſt frequently be ſuſpended, or a vehement agony for breath will certainly come on. During the day, if no particular hurry occur, the breathing becomes gradually more free till the evening, an inexperienced Aſthmatic even flatters himſelf that his diſeaſe is retiring, but he finds at the approach of night that he muſt ſuſtain a new attack. The paroxyſm recommences with the uſual ſymptoms, and the night is paſſed nearly as the former, but the ſleep is more perfect, and productive of more relief.

The third day, the remiſſion is more complete, there is ſome additional expectoration, and motion is performed with leſs diſtreſs, but ſtill with great inconvenience. After the paroxyſm has been renewed in this manner for three nights, expectoration generally becomes free, but there is no certain termination of the fit at a fixed period. However, except in particular caſes, it goes off after a few days. And as the daily remiſſions become more perfect, the urine is higher coloured, and in ſmaller quantities, the expectorated mucus is more copious and digeſted, ſtrength of pulſe and vigour of action encreaſe, and good humour and ſunſhine again enliven the mind.—The expectorated mucus has been ſaid to be ſtreaked with black, or to have a blackiſh tinge, and this appearance certainly prevails in many inſtances, but not invariably. The taſte of the expectorated mucus is alſo equally uncertain; it is ſometimes ſweetiſh, but more frequently ſaline, and occaſionally coloured minutely with blood.

There is conſiderable variation in the times of acceſſion of the paroxyſm, and the length of its duration, the intervals between the fits, the quantity of mucus expectorated, and the freedom of that diſcharge. Theſe circumſtances of the diſeaſe will be influenced by the pre-diſpoſing cauſes and occaſional accidents. The diſeaſe appears to invade all temperaments; but, I believe more particularly the melancholic, or that which is between the melancholic and ſanguine. The ſanguine being in fact more liable to fall into phthiſis.

This deſcription ſeems to apply to the convulſive Aſthma of Profeſſor Cullen. I wiſh it to be received as that of the *Firſt Species* of this inquiry, which the Author ſuffered in his own perſon for many years.

In examining the ſymptoms of a paroxyſm of this diſeaſe, we find ſome uniform and conſtant, and others generally occurring, but with uncertainty, in proportion to the various influence of remote cauſes.

The ſymptoms which are ſufficiently conſtant to diſtinguiſh it are deſcribed by Dr. Cullen in his Noſology.

"A difficulty of breathing coming on at in-
"tervals.
"A ſenſe of ſtraitneſs in the cheſt.
"A wheezing in reſpiration.
"Cough in the beginning of the fit, difficult
"or none; towards the end free, and attended
"with expectoration which is often copious."*

In endeavouring to find the cauſe of theſe ſymptoms, I ſhall purſue the ſteps which have before led me to the ſource of ſimilar appearances, expecting to find a cauſe equal in its properties of acrimony or bulk, by which the reſpiratory muſcles are irritated into exceſs of action.

In thoſe diſorders a material was excreted, or a compreſſing force was removed, before the extraordinary contraction of the muſcles was ſuſpended, or finally made to ſubſide. In ſome caſes a mechanical inconvenience, as in the inſtance of a gibbous ſpine, could not be removed, and then the irritation remaining, the diſorder of reſpiration did not ceaſe.

In ſuch circumſtances the indications were natural, and conſiſtent with the laws which govern the animal œconomy. They would have afforded prima facie evidence that nature was deſirous to diſcharge ſomething injurious, even if it had not been expoſed to the ſenſes.

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* Aſthma. Spirandi difficultas per intervalla ſubiens; cum anguſtiæ in pectore ſenſu, et reſpiratione cum ſibilo ſtrepente; tuſſis ſub initio paroxyſmi difficilis, vel nulla, verſus finem libera, cum ſputo muci ſæpe copioſo. Noſolog. Method. G. LV.

Having aſcertained ſuch outlines and ſignals of direction, we muſt follow the path in which nature is our guide; and we are encouraged by the acknowledged ſimplicity and uniformity of her laws, to hope that the ſame principle of *irritation* has excited her efforts in one caſe of Aſthma, as in another, though it may be more retired from our view, and wear a different form.

In this ſpecies of Aſthma it appears, that the ſame efforts of the muſcles of reſpiration are exerted as in the Continued Species of Floyer, and that in general a continuance of too much action of thoſe muſcles is the only diſtinction to be perceived in the latter ſpecies. There would have been leſs hypotheſis, therefore, in the inference, that ſimilar effects proceeded from ſimilar cauſes.

The permanence of the ſymptoms in one ſpecies was accounted for, and their ſuſpenſion in the other might have been, if the functions of the animal ſyſtem had been well conſidered; ſince theſe furniſhed a means of ſilently removing the particular irritation which the data might have ſuggeſted to be the occaſion of the Periodic, as well as the Continued Aſthma.

We cannot trace the cauſe of appearances in the animal machine, without conſtant reference to the laws of the œconomy of life, any more than the general philoſopher can take a latitude independent of immutable principles in reaſoning on the natural objects of his inquiries.

Sir J. Floyer, deſcribing the *Periodic Aſthma*, ſays, "the diaphragm is not without much difficulty "moved downwards; but for enlarging the breaſt "in inſpiration, the intercoſtal muſcles, which "ſerve for the raiſing of the ribs, and lifting up "the breaſt, ſtrive and labour more vehemently; "and the ſcapular and lumbar muſcles which "ſerve for ſtrong inſpiration, join all their force, "and ſtrain themſelves to lift up the breaſt and "ſhoulders, for enlarging the cavity of the breaſt, "that the lungs may have a place ſufficient for "their expanſion, and the air more plentifully "inſpire."*

Here is ſufficient evidence of diſtreſs in labouring to accompliſh ſome object, but though Floyer had perſonal experience of the diſeaſe for thirty years, he had not begun to conſider it as the energy of nature endeavouring to remove an offence.—This can only be accounted for by ſuppoſing that he was influenced by a prevailing theory, and that obſerving in ſome very few inſtances of the diſorder no diſcharge of mucus or other extraneous matter, he was diſcouraged from following to their ſource, ſymptoms which uniformly attended the progreſs of general caſes: we ſhall be ſtill leſs ſurpriſed at the circumſtance if we reflect upon the ſmall advance which had been made in the knowledge of the lymphatic ſyſtem, whoſe power is exerted with ſuch effect in the removal of ſerous effuſion in every cavity of the body.

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* Floyer on the Aſthma, p. 7.

Phyſiologiſts have ſince referred, with more preciſion, ſuch occaſional increaſe of powers to the urgency of ſome obſtacle to the freedom of reſpiration. In thoſe caſes, ſays Haller, the muſcles inſerted into the thorax, clavicles and ſcapulæ, unite their force. "Scaleni muſculi, maſtoidei, "trapezii, pectorales, tum levatores parvi, quos "ex anatome oportet repetere."*

That the abſorbent veſſels are equally incited when the lungs are threatened with ſuffocation, appears from the obſervation of Mr. Cruikſhank,† "I have repeatedly ſeen in animals "dying of hæmoptoe, and in the human ſubject "itſelf, the lymphatics of the lungs, which at "other times contain a tranſparent fluid, turgid "with blood, which they had abſorbed from the "air cells."

Motions performed with great energy are therefore ſtrong indications of ſome injury to be averted, or ſome offence to be removed. And, as in the Periodic Aſthma, the cauſe is not ſo indiſputable as in the Continued Species, I ſhall take advantage of theſe indications, as the beſt direction which an obſcure diſeaſe affords.

They point to an *irritation* in the lungs, or in ſome of the viſcera, which, in common with the lungs, are aided by the reſpiratory muſcles.

It appears from the preceding ſections, that ſuch irritation may be *material*, we ſhould therefore

* Pr. Lin. Phiſiolog. CCLXIV.

† On the abſorbent veſſels, p. 42.

conſider, if any excretion of matter favour the ſuppoſition, or if any appearance of offence conſtantly accompany the diſeaſe, and vaniſh when it diſappears; or, being occaſionally abſent, if its abſence can be accounted for by certain acknowledged laws of the animal œconomy.

SECT. V.

The preſence of mucus in Aſthma.—The origin of this ſerous fluid.—The obſervation of writers on this ſymptom of the diſeaſe.—The earlieſt medical authorities.—Galen—Alexander Trallianus.—The Arabian Phyſicians.—Remark of Willis and criticiſm of Morgagni on the opinions of the antient authors.—Medical writers of the 16*th and* 17*th centuries.—Jodocus Lommius—Sennertus—Riverius—all acknowledged the exceſs of Serum in Aſthma, and made it a cauſe of the diſeaſe.—The doctrine of Willis founded on this condition of the fluids.—Conſiderations on the authority of Willis.*

THE ſpitting of mucus is ſo general a ſymptom of convulſive Aſthma, that the matter muſt have been conſidered as the principal cauſe of ~~the~~ this diſeaſe by modern phyſicians, but from ſome few caſes having occurred without expectoration, and of others where it was not conſidered equal to the effect produced; theſe inſtances of Aſthma have however been uncommon, and might proceed from the ſame proximate cauſe embodied in a more ſubtle form, as in the *ſecond ſpecies* of this inquiry; or the lymph might have been carried off by the abſorbents, if this irritation were ſeated in the lungs, as in this ſpecies. But the *general* preſence of mucus is a conſpicuous part of the diſeaſe, ſince it is partially expelled from the bronchia as the paroxyſm declines, and copiouſly in moſt caſes at the termination.

This matter is ſeparated upon the membranes of all the cavities of the body.[*] Where thoſe cavities have external openings it is not coagulable by heat, but where there are no external openings it is coagulable in the heat of boiling water.

Its quantity in general will be found to be regulated by the vigour of the animal, becauſe the power of abſorption bears a relative proportion to his ſtrength or weakneſs.

An acute phyſiologiſt makes the following diſtinction: "In diſeaſes where the contraction of "the veſſels is too great, there is ſcarcely as much "moiſture in the cavities or interſtices of the parts "as allow them to ſlide eaſily one upon another. "In health the quantity of ſuch liquors is moderate, and a pretty conſtant equality is kept up "between the action of the exhalents and abſorbents: but when the body turns weak the exhalents pour out ſo much more than the abſorbents "can take in, that all the cavities are found to "contain conſiderable quantities of liquors."[†]

In attributing one ſpecies of Aſthma to the influence of this irritation, the authority of former writers may naturally be conſulted; but here we muſt be careful to limit our confidence in the evidence to the deſcription of appearances, excluding a partial bias to prevailing theories, or averſion from thoſe which are exploded. The former may not conſiſt with the teſtimony of facts, and the latter ought not to involve in their diſgrace the record of thoſe facts which experience has rather eſtabliſhed than oppoſed.

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[*] Ὀῤῥὸς ſerum and lymph are not proved to be different from mucus, and diſtinctions can only be taken according to the conſiſtence of the fluid. They are equally the watery part of the blood, ſeparated in a condition more or leſs morbid.

[†] Alex. Monro, Sen. Works, p. 377.

It may be unneceſſary to examine *all* the old writers for their opinions on Aſthma, but let us conſider the teſtimonies of ſome few who had weight in the periods when they flouriſhed.

From theſe we may fairly infer what would be produced by a more extended inveſtigation; in fact, the cotemporary writers, and thoſe who followed them, entirely coincide with their brethren, and as far as I have been able to purſue the inquiry, no variety of deſcription is to be diſcovered.

Galen makes two cauſes only of Aſthma, each diſtinguiſhed by a material producing irritation, thick and pituitous humours, and a crude tubercle in the lungs.

Alexander Trallianus does not expreſſly mention Aſthma by name, but doubtleſs alludes to that affection when he treats of the "ſigns of "viſcid humours contained in the lungs." Viſcid ſerum, and extraneous ſubſtances, were the only recorded cauſes of Aſthma at this period of medical obſervation: nor is any alteration to be expected during the interval of many centuries.

At length the Arabian adopted the pathology of the Greek phyſicians, with ſome addition, but little or no rejection of their facts: in Aſthma their doctrine was accepted without diſpute; and the remedies directed were to incide, dry up, expectorate, divert, and purge off ſerous humour in the lungs. Avicenna gives the caution of not uſing the moſt powerful diuretics, leſt the thinner fluid ſhould be diſcharged, and the thick remain behind.

This practical direction reſulted from the deference which the Arabian phyſician paid to the doctrines which he received from Greece. Pituita was ſuppoſed to take a conſiſtence according to the ſituation in which it was included after it had deſcended from the head. At firſt it was watery and thin; then mucous as it was thickened by warmth; when the mucous diſtillation was ſhut up in a cold part of the body, it became vitreous; and in this ſtate would create exceſſive pain if transferred to a hot ſituation: it was laſtly gypſeous, or ſtony, when included in the lungs, kidneys, or joints; becauſe here the humour being reſolved, and the thinner parts carried off, the thickeſt hardened into calculous ſubſtance.

When ſuch were the only cauſes clearly aſſigned by the ancient writers for the production of Aſthma, Willis might juſtly remark, that they were not aware of a purely convulſive affection in conſidering the general character of that diſeaſe. Morgagni,* by his criticiſm, has not invalidated the aſſertion of Willis; for though the nerves may be ſometimes particularly affected in the opinion of thoſe authors, the impreſſion is from defluxion of ſerum, pituitous matter, or its ſuppoſed origin, the vapours from the lower viſcera. It is a very ſtrong proof of the infrequency of Aſthma, without manifeſt irritation from ſuch cauſes, when the exiſtence of more obſcure cauſes is matter of debate.

The Arabian writers were themſelves copied with ſervile dependence till the ſixteenth, and even the ſeventeenth century, when the diffuſion of anatomical knowledge, and a zeal for experiment, gave more clear diſcernment of cauſes and effects, and more juſt reaſoning on their relation. We ſhall therefore offer ſome opinions on Aſthma at thoſe periods; and particularly of Willis, who has given ſo remarkable a tone to the teachers who followed him, that his authority on this diſeaſe may be traced through Hoffman, Floyer, and Cullen, who, however, appear to have had a very imperfect comprehenſion of his principles and meaning.

Jodocus Lommius† gives the ſigns of this diſeaſe under the term Anhelatio. He attributes it to concreted phlegm, and even ſtones in the lungs; and cloſely adheres to the antients in neglecting other cauſes.

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* Liber II. Epiſt. xv.

† Obſervat. Medicinal. Liber Secundus, p. 110, necnon p. 115 & ſeq.

Sennertus* delivers a pathology which entirely depends on the extraneous and evident irritation of ſubſtances deſcribed in the firſt part of this Inquiry; or, ſecondly, on the ſerous humour which obſervation had eſtabliſhed as the predominant ſymptom of Aſthma. He informs us, that the proximate cauſe of Aſthma is the ſtraitening of the bronchial tubes from compreſſion or obſtruction of humours often thick and viſcid; ſometimes thin and ſerous, but copious in quantity.

The hereditary diſpoſition to Aſthma is alſo ſtated to conſiſt in a certain laxity and weakneſs of the lungs, by which the organ is frequently more liable to receive a flux of humours, and to permit their accumulation. In the prognoſtic, he ſays, other ſymptoms beſides the pulſe and reſpiration, muſt be attended to; for theſe may deceive the phyſician. Some patients die ſuddenly by ſuffocation, with a good pulſe; whilſt others, having a bad pulſation, are quickly reſtored by the diſperſion of flatus, or *the diſcharge of ſerous humour*.

According to Riverius† though the generic term Aſthma take in all difficulties of breathing, it more particularly points out that diſorder of reſpiration which ariſes from the infarction of the bronchia, in its proper character, without fever, though ſometimes fever may attend. The diviſions of Aſthma are into Dyſpnœa, Aſthma, and Orthopnœa. The Dyſpnœa is inferior in degree to Aſthma and Orthopnœa, being the effect of a leſs quantity of matter obſtructing the lungs; it is therefore without wheezing. Aſthma is then deſcribed with this attendant ſymptom: for, ſays the writer, in Aſthma, properly ſo called, the bronchia are filled with a pituitous humour, which, meeting the air in reſpiration, occaſions the ſound called wheezing. Orthopnœa is the extreme degree of this diſorder of reſpiration.

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* Tom. ii. lib. ii. Part III. cap. 2.

† Vide Praxeos Medicæ, lib. 8. cap. 1.

By theſe examples we may ſee, that, in this period of medicine, an exceſs of ſerum was a permanent feature in the character of Aſthma; and that, if a flux from the head were occaſionally ſuperſeded, a flow of this matter from the pulmonary veſſels took its place in the prevailing doctrines.

Caſes of Aſthma, ſo purely convulſive as to be independent of ſerous defluxion, muſt have been extremely rare; for they are not acknowledged as a ſpecies, nor ever clearly excepted from the general account.

However tedious it may therefore be to inquire into the hiſtories of the antient writers, the examination muſt be uſeful, if it lead to this concluſive inference, that no ſuch diſeaſe as Convulſive Aſthma, *without a manifeſt cauſe*, was obſerved from the earlieſt records of medicine, till the time of Cullen, who has, however, denied to the majority of caſes, the exiſtence of ſuch cauſe.

Willis admits the Aſthmatic affection to be free from an organic fault in the lungs in ſome inſtances, but he does not exempt theſe, though termed purely ſpaſmodic, from the exciting influence of abundant ſerum. The procatarxis is, in his language, a redundance of ſuch humours in the maſs of blood, and in the whole body:[*] "cujus materiæ portio quædam ~~quædem~~, arteriarum oſculis in pulmones exudans, tuſſim ordinariam creat; poſtea cum ſeroſa colluvies adhuc in ſanguine exuberans, et particulis ſpaſmodicis referta, etiam intra caput aggereretur, eadem nervos pneumonicos ſubiens, tuſſim ſimplicem, in convulſivam adauget." This account ſeems to give as much importance to material irritation as if he had entirely declined the conſideration of any other cauſe, for the prediſpoſition conſiſts in a condition of the blood leading to effuſion in the lungs, and the next ſource of convulſive motions is the ſerous colluvies, which is every where referred to.

We next ſee the Dropſy, the Aſthma, and the Scurvy, united in his explanation of the convulſive diſorder.[†]

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[*] Willis Opera. Tomus Prior de Morbis Convulſivis, Caput. xii. p. 137.

[†] Willis de Morb. Convulſive, Caput xii. p. 138.

Afterwards, the language is ſtill leſs ambiguous, becauſe he directly and plainly terms that form of Aſthma, *purely convulſive*, which ariſes from the ſerous colluvies of the habit, "porro interdum "obſervavi, *graves Aſthmatis paroxyſmos*, ſine qua-"vis notabili pulmonum labe accidiſſe; revera ut "putaverim, hunc *morbum* aliquando eſſe *mere* "*convulſivum*, ejuſque inſultos ſolummodo excitari "quoniam *ſeroſa colluvies*, particulis exploſivis re-"ferta, *nervos*, pulmonum diaſtolen perficientes, "ſubiens, ſpiritibus, ibidem ſcatentibus accrevit."*

Willis, it thus appears, had not in his contemplation a ſpecies of Aſthma entirely diveſted of the character which has been lately only given to the humoral Aſthma. Whilſt his authority has been followed by the noſologiſts and teachers of the modern ſchools of medicine, his meanings have been perverted, or his context not ſtudied. It is only by reference to his doctrine of Convulſive Cough and Aſthma in the twelfth chapter, *de Morbis Convulſivis*, and by conſidering his opinions, "*de Reſpirationis Læſæ Speciebus*," that his treatiſe "*de Aſthmate*," which follows, can be properly underſtood. In the latter he alludes to his general theory of the cauſe of convulſions, and applying it in Aſthma, we are to follow his data when we accept his concluſions.†

He firſt eſtabliſhed the doctrine of convulſive motions in Aſthma, and ſucceeding writers have generally contented themſelves with adopting his theory. "It is aſtoniſhing," ſays Morgagni, "that Willis ſhould have been the firſt who obſerved the nature of ſymptoms, which we have "univerſally, ſince his time, acknowledged to "exiſt in Aſthma."*

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* Willis de Morb. Convulſiv. Caput. xii, p. 138.

† Vide Opera, Tom. Poſterior de Aſthmate, p. 125.

It is, indeed, truly remarkable, that phyſiologiſts neglected to notice, that convulſion is nothing but a violent and irregular contraction of the muſcle or fibre; and if ſuch be the contraction of a muſcle of reſpiration, it may be juſtly ſaid to have become convulſive or ſpaſmodic.

But if ſurpriſe be excited by the nature of the contractions in Aſthma not having been aſcertained before the time of Willis, ſtill more may be expreſſed, that ſucceeding authors have been ſo occupied in contemplating the new actions, as to forget the evidence of the ſtate of the habit in which they were ſaid to take place, and which was by Willis eſteemed ſo prominent and conſpicuous, as to be the very cauſe exciting the morbid motions which he deſcribed.

Nor is it a matter of indifference whether convulſions exiſted with or without the excitement of irritating matter in caſes of Aſthma, ſince we have only to concede the point that they exiſted without ſuch irritation in this ſpecies, where ſeroſity has been proved to be abundant, and the inquirer may be ſtill better ſatisfied with this eaſy ſolution in ſome other caſes (called the Dry Aſthma) where the irritating material cannot be ſo readily diſcovered; and thus we are led into error, for that concluſion muſt deſerve the name which is drawn from falſe premiſes, and contradicts the laws of the animal œconomy.

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* Morgagni, lib. ii. Epiſt. 15, 5.

SECT. VI.

Anatomical evidence of ſerous effuſion in the veſiculæ of the lungs of Aſthmatics.—Effuſion in complicated caſes very frequent; in uncomplicated caſes ſeldom inquired for, but occaſionally diſcovered.—A ſeries of Anatomical Obſervations applying to complicated and uncomplicated Convulſive Aſthma.—The Suffocative Catarrh conſidered.—Evidence in Living Subjects of exceſſive Effuſion in the Veſiculæ of the Lungs, as palpable as from Diſſection.—This Condition ſupported by the Deſcription of Aſthma by Cælius Aurelianus.—Phyſiological Conſiderations on the Entrance of Serum into the Air Cavities of the Lungs.—The Experiment of Dr. Goodwin and Hales.

UNCOMPLICATED Aſthma is ſo ſeldom fatal, that few opportunities have occurred of ſearching for its cauſe by diſſection. For this *Morbus Maxime Terribilis*, as it is called by Willis, may be carried on to old age, if ſupervening diſeaſes do not deſtroy the patient, or diſturb the operations of nature, by which recovery from the paroxyſm may be accompliſhed.

Many inſtances may be found of effuſion in the veſiculæ from complicated cauſes; but effuſions in the ſacs of the pleura, and in the pericardium, are more generally diſcovered, as theſe are frequent conſequences of inflammation, polypi in the large veſſels, or oſſifications of their coats.

But though caſes of uncomplicated Spaſmodic Aſthma are not very likely to become objects of examination, an acute diſorder may have attacked the Aſthmatic, and the contents of the thorax may be marked with the conſequences of recent inflammation: Dropſy may pervade the habit, and effuſion will be found in the cavity of the breaſt, or in the cellular ſubſtance, as well as in the veſicles of the lungs; or it may only be found in the ſacs of the pleura, and the cells of the lungs may have been relieved by natural abſorption; for, whilſt that power is alive, it may be expected to uſe its energies in defence of the laſt reſervoir of vital ſtimulus.

For theſe reaſons, the preſence of ſerum in the lungs might not always occaſion wonder, and we may therefore be leſs ſurpriſed at the neglect of this cauſe of Aſthma when pathologiſts conſidered the diſeaſe.

Though Morgagni frequently diſcovered ſuch a condition of the air veſicles, when the patients had laboured under diſordered reſpiration, he generally contents himſelf with recording the fact; and dwells longer on the alterations of organic ſtructure, which he had an opportunity of remarking. The effuſions into the cavities of the cheſt and the pericardium alſo are more carefully noticed than effuſions in the veſiculæ and bronchia: the latter could not, in caſes commonly occurring, occaſion death; the former are frequent cauſes of death, though their preceding ſymptoms may be leſs diſtreſſing than the paroxyſm of convulſive Aſthma.

We are therefore not to expect ſo much demonſtrative evidence of effuſion in the air cavities in caſes of ſimple Spaſmodic Aſthma, as in others where that might be the attendant diſorder, but where life was terminated by one of more deciſive violence.

But as there is ſome light to be obtained from theſe complicated caſes, we ſhall preſent a few.

I ſhall likewiſe be determined by the account of ſymptoms, to claim, for the advantage of our inquiry, caſes which may be claſſed under other heads, but which I believe to belong to convulſive reſpiration.

OBS. I. MORGAGNI's obſervation of morbid bodies had induced him to give a ſpacious opinion which embraces our aſſigned cauſe of Aſthma. He ſays, that concretions in the bronchial tubes, and indurations of their glandules, very often aroſe from viſcid humours, or pus remaining too long in theſe paſſages, or the air cells at their extremities:* this is informing us in other words, that after fluid matter has been preſent to occaſion Periodic Aſthma, it is capable of becoming the cauſe of Continued Aſthma; a ſpecies which has been treated of in the firſt part of the Inquiry, where may be found much authority in ſupport of the reaſonableneſs of his ſuggeſtion.

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* De Cauſis et Sedibus. lib. ii. Epiſt. xv. Art. 19.

This author preſents us alſo with ſome detached facts, which are to be claſſed as complicated caſes of Aſthma.

Obs. II. The lungs of an Aſthmatic ſubject, deſcribed Epiſt. xxii. Art. 4. were found in the following ſtate: — The right lobe was ſound, but in the lower part very red; the left was univerſally pale, contracted, and hard, and contained ſanious matter.

Obs. III. Article 34. Epiſt. XVIII. A hiſtory of the diſſection of a patient, whoſe diſeaſe was denominated Convulſive Aſthma.

The heart was diſeaſed, and the lungs were filled with a frothy liquor; but there was no effuſion in the cavity of the cheſt.

Obs. IV. Article 30. Epiſt. XXI. A diſeaſe of the breaſt is reported, which was accompanied with laborious reſpiration. The air cavities of the lungs were found to be filled with frothy ſerum.

Obs. V. Fabritius Hildanus opened a ſubject, who became aſthmatic after a concuſſion of the brain. The diſeaſe ended fatally from a catarrh falling on his lungs. The lungs were found every where filled with pituitous and viſcid fluid. See Cent. I. Obſ. XI.

Obs. VI. Hollerius, Prax. lib. i. cap. 25. in ſcholiis, has informed us of an Aſthmatic, in whoſe lungs, after death, the ſame pituitous fluid was found as in the preceding caſe.

Obs. VII. A woman of forty years of age is ſtated to have died of Aſthma; but ſhe had alſo a ſtone in the kidney. A great quantity of frothy water was found in the cells and bronchia of the lungs.

This anatomical hiſtory is given us by Frederic Ruyſch. See his works, Tom. i. Obſ. LVI.

Obs. VIII. For another inſtance of this morbid appearance in the lungs of a ſubject, who had ſuffered the Aſthma, ſee Riverius, Obſervat. LX. Centur. i.

Obs. IX. An Aſthmatic died, and his lungs were found filled on both ſides with ſerum; but there were likewiſe adheſions to the diaphragm and pleura. The pylorus was diſeaſed, and alſo the duodenum and pancreas: the pineal gland was full of white concretions.

This diſſection is communicated by H. Ridley, in his Obſervations de Aſthmate et Hydrophobia. They are given in German with Floyer's treatiſe, by Joanne Chriſtian Frederic Scherf.

The extreme caſe of ſerum in the veſiculæ muſt be when concurring diſeaſes have ſo weakened the patient that the habit cannot be excited to diſcharge it. When irritability has been ſo reduced, ſuffocation has really taken place, and inſtances have been often recorded where the danger of this event was imminent and great.

Obs. X. Morgagni* gives the hiſtory of a maiden ſubject, who died with a fluid running out of her mouth. She had taken cold at the time of menſtruation; and difficulty of breathing was a reigning ſymptom. The abdominal viſcera and uterus were in a very morbid ſtate; but the lungs were diſtended with a *frothy ſerum.* The diſſection does not prove that ſhe died from the ſtate of the lungs only, but that an effuſion had taken place in that organ; and it appeared that the natural effort of reſpiration was unequal to contend with that particular affection, for the fluid iſſued from her mouth agreeably to the feature which Cælius Aurelianus has given in his deſcription of Aſthma. An inſtance ſimilar to this, as far as regards the affection of the lungs, will be ſeen in a patient who ſurvived the diſcharge, and whoſe caſe is an acknowledged Aſthma.

Inſtances of this kind are too numerous to be inſerted, I ſhall, therefore confine myſelf to a few caſes, which are, in my opinion, evidently inſtances of Spaſmodic Aſthma; but without affording ſubject of theoretical debate, by a connection with chronic diſeaſes of the viſcera.

Obs. XI. In opening into the cheſt, ſays Dr. Baillie,† "It is not unuſual to find that the

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* Epiſt. xxi. 29.

† Morbid Anatomy, p. 50.

" lungs do not collapſe, but that they fill up
" the cavity completely on each ſide of the
" heart. When examined, their cells appear
" full of air, ſo that there is ſeen upon the ſur-
" face a prodigious number of ſmall white ve-
" ſicles; the branches of the trachea are at the
" ſame time much filled with a mucous fluid.
" This is not uncommonly the caſe in perſons
" who have laboured for ſome conſiderable time
" with difficulty of breathing, but without any
" ſymptoms of inflammation; ſuch perſons would
" appear to die from want of a ſupply of atmoſ-
" pheric air ſufficient to produce the proper
" change in the blood, which is neceſſary for its
" uſeful circulation through the body."

Obs. XII. A maſon was admitted an out patient of the Leiceſter Infirmary in the year 1786. He had been affected with Aſthma ſeveral years, which he traced to a ſevere cold. The habit of this man was thin, and his temperament inclined to ſanguine: the paroxyſms had been moſt ſevere in the winter, but had frequently attacked him in the milder ſeaſons. He had generally purſued his labour without much conſideration of his diſeaſe; allowing himſelf but one or two days of reſt for the paroxyſm to abate. At the time of his admiſſion, the pulſations at his wriſt were frequently indiſtinct, and at other times intermitted; his feet were œdematous, his countenance pale, his breath always ſhort; he had ſome cough, but he only expectorated after the paroxyſms. He had ſevere attacks in the evening; and if he was free ſome weeks from violent ſymptoms, the invaſion of the fit was truly regular in the manner of Spaſmodic Aſthma. I directed ſome emetics and abſorbents, after the uſe of which the pulſe was more regular. He then took expectorating and diuretic medicines with great relief; and at length was at leaſt ſo well as to leave off attendance. His pulſe was at its former ſtandard, his appetite was mended, his flatulence gone, expectoration much more free, urine natural, reſpiration not much diſturbed by exerciſe, and the paroxyſms loſt. At the beginning of the following winter I was deſired to call upon the ſame man, who having been greatly expoſed to wet and cold was laid up in his own dwelling. His difficulty of breathing was now ſo great, and the ſymptoms were ſo critical as to leave little expectation of his living through the night. The application of bliſters to the breaſt and legs, puking, and then volatile ſtimulants, gave only temporary relief, and he ſunk under his weakneſs, having had a regular paroxyſm two nights before, which had not been ſucceeded by expectoration. I was permitted to open the body, an object which had induced me to viſit the patient with ſome aſſiduity after I had ſeen the improbability of his ſurviving the ſtate of weakneſs in which I found him.

The abdominal viſcera exhibited no mark of diſeaſe, the bowels were emptied of fæces, and the ſtomach was very flaccid, and expanded in the coats; the head contained no exceſs of ſerum, but the veſſels were rather turgid; the lungs were very heavy, and being preſſed, a frothy liquor was made to iſſue from his mouth. The ſubſtance was then cut open, and the cells and bronchia were found full of ſerum, of a light colour, unmixed with blood; there was only the uſual moiſture in the pericardium, and the ſacs of the pleura; the heart and large veſſels were natural. After the ſerum had been diſcharged by preſſing the lungs, the mucus, which ſtill adhered to the coats of the veſicles, appeared more frothy than the general maſs, and was alſo of a darker colour, making the membrane in ſome places nearly black.

The diſeaſe deſcribed by Dr. Millar has been ſubject of doubt; Cullen places it under Cynanche Trachealis, and conſiders it as the Croup. It is, however, not clear, that Spaſmodic Aſthma would be a different diſeaſe from this, if it attacked infancy only; at all events, it appears different as far only as it was accompanied with fever and inflammation. In the extreme irritability of an infant ſubject, inflammation may occur with other ſymptoms ariſing from cauſes obſtructing the air veſicles, when in adults theſe cauſes may induce aſthmatic paroxyſms, without exciting fever, or ſo much ſenſation as to inflame the organ; for theſe reaſons it may be proper not to omit the obſervations of Dr. Millar on the morbid appearance of two infant ſubjects.*

Obs. XIII. A child died in the firſt ſtage. The external parts were ſoft and œdematous; the lungs, and all the other bowels were ſound; the ſtomach and inteſtines were much inflated with rarefied air, but contained no fæces.

In this inſtance there is no difficulty in concluding that the child was carried off by a convulſion before the lungs could be affected. The great diſtention of the ſtomach permits the inference of indigeſtion having been a previous complaint, and that the firſt paſſages were very feeble; this condition might ſuddenly induce difficulty of breathing, and, in the irritability of infancy, the conſequences which happened are not uncommon. The abſence of inflammatory appearances in this diſſection takes away the probability of the Croup havng deſtroyed the child. It ſeems to belong to the third ſpecies of Convulſive Aſthma.

Obs. XIV. A child died in the ſecond ſtage deſcribed by Dr. Millar. She had laboured under violent ſymptoms of the Aſthma till the tenth day.

The veſſels of the pleura, on the ſurface of the lungs, and of the trachea, were turgid, and ſeemed obſtructed; the parts had a livid appearance, reſembling that which is obſerved when an inflammation terminates in a gangrene; the bronchial veſſels were filled with a white, tough, gelatinous ſubſtance.

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* Vide Dr. Millar on the Aſthma and Hooping Cough.

The *Suffocative Catarrh* is deſcribed by Schneider as follows:—" It is allied to the apoplexy and " ſyncope, but is diſtinct from thoſe affections: " the diagnoſtic ſigns are, a weight and pain of " the breaſt, a difficulty of reſpiration, an inter- " rupted voice, danger of ſuffocation, anxiety, " ſometimes a cough, a ſlow pulſe; the mem- " brane lining the noſe and mouth before, and be- " hind diſcharges a flux of ſerum, with which the " mouth is occaſionally filled."*

If wheezing had been a ſymptom deſcribed by Schneider, and the inflammation of the mucous membrane of the noſe and mouth had been omitted, the character given of Suffocative Catarrh would not have been improperly applied to Spaſmodic Aſthma: there is, doubtleſs, a diſtinction between the diſeaſes; but there may be ſubjects affected with this Catarrh in whom the line of ſeparation will be loſt.

If the tone of the exhalents of the lungs be greatly reduced in a habit diſpoſed to a ready aſſociation of muſcles, and particularly of morbid contractions of the reſpiratory muſcles, Aſthma may be the diſeaſe occaſioned by the defluxion, which, in other ſubjects, might be called Suffocative Catarrh.

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* Schneiderus de Catarrh. L. v. c. 4.

Obs. XV. The hiſtory of the Catarrh which prevailed in Italy in the year 1730,* gives a ſpecimen of Aſthma terminating the more acute diſeaſe. The cardinal Johannes Franciſcus Barbadicus died of a diſorder, which Morgagni calls a Suffocative Catarrh, and which was probably a ſpecies of that epidemic which is now called influenza: whatever were the affection, its progreſs was marked by ſo conſiderable a diſorder of reſpiration as to merit the name of Aſthma, and when he could no longer expectorate, the patient died from ſuffocation. His lungs were found full of ſerous fluid; but there was no adheſion, or other mark of inflammation. His phyſician's words are as follow:—"Graves erant ipſi pulmones, ſed a catarrhali, quam continebant, materia, multa paſſim e bronchiis, quacunque incideres, erumpente. Certe eorum omnis ſubſtantia flaccida, non modo non denſa, aut compacta reperta eſt." The ſubject was gibbous, and ſeventy-two years of age, and as he had been frequently affected with defluxions on the lungs, the termination of the diſorder could excite no ſurpriſe, any more than the morbid appearances on diſſection. Had this plentiſul effuſion of mucus, or ſerum, fallen on the lungs of a younger man, whoſe irritability had been leſs exhauſted, the energy of the reſpiratory muſcles, and of the abſorbing veſſels, would have been equal to the taſk of delivering the organ from the oppreſſive fluid; and the patient would probably have recovered, to fall under the ſymptoms at a future attack.

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* The epidemic catarrh, or influenza, raged on the Continent, 1580, 1675. See Bergerus de Circul. Lymphæ. C. ii. § 7. Foreſtus, Lib. vi. Obſ. 3.

Morgagni particularly aſſerts, that this patient was not affected before he died, with any ſymptom of peripneumonic fever, nor were any ſigns to be diſcovered in the lungs of ſuch an affection, after death. We may ſafely ſay, that he expired under a paroxyſm of Aſthma, in which the convulſive motions were as ſtrong as his irritability would admit.*

Obs. XVI. An eccleſiaſtic advanced in life, with a ſhort neck, and fat, had been long out of health: he led a ſedentary life, and was cachectic. (*Cocochymiam valde ſcorbuticam contraxerat.*) He was ſo affected with difficult reſpiration, and heavineſs of the head, that he was capable of no exerciſe, except that of going to chapel, and returning every day. There he was ſeized with inſenſibility, and ſoon died.

The following day the body was opened; and there was no doubt of a diſeaſe, ſo ſuddenly fatal, having left veſtiges in the brain where the cauſe probably lay. The encephalon was accurately examined, but, to the ſurpriſe of all, was found,

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* See Morgagni, Epiſt. xiii.

" *Morbi, licet atrociſſimi ne vel umbra quædam ſupe-*
" *rerat.*" Proceeding to the thorax, the heart was found perfectly firm, and entirely free from any obſtruction or polypous concretion. The cauſe of the laborious reſpiration, and ultimately of the death of this patient, was at laſt diſcovered in the ſubſtance of the lungs, this organ being diſcoloured, and its veſicular cavities entirely filled with a *frothy ſerum.*[*]

Thus diſſection has furniſhed ſome inſtruction in this Inquiry, but ſtill more is to be obtained from a conſideration of the following important caſe, in which the genuine cauſe of one ſpecies of Convulſive Aſthma is ſhewn more convincingly than by diſſection of a dead body; at the ſame time it ſerves to confirm the concluſion which the caſes we have juſt given lead to, and obviates the objection, that the appearances, after death, may have been effects of the diſeaſe, inſtead of the cauſe.

A female,[†] was ſeized with a complaint that very much reſembled the paroxyſm of Spaſmodic Aſthma; it was, however, more violent than firſt attacks uſually are, and its remiſſion was attended with a very copious diſcharge of *frothy ſerum* from the bronchia, which was thrown up by a ſlight, though almoſt continual cough. After occaſional relief, the diſeaſe returned in ſixteen months as violent as at firſt. She was then attacked, after comfortable reſt, at five in the morning, with Dyſpnœa and Convulſive Cough; danger of ſuffocation was ſoon perceived; the ſenſes forſook her, the face became livid, the extremities cold, and the pulſation at the wriſt was loſt: this ſtate continued for two hours, during which time a very large quantity of frothy ſerum, tinged a little with blood, was diſcharged, without any viſible effort, by the mouth and noſtrils. "Then ſome very faint and involuntary efforts to cough came on, which gradually increaſed, *and with every effort large quantities of the frothy ſerum were thrown off; perhaps the whole quantity might amount to three or four pints.* About three hours after the time of attack, the difficulty of breathing became very ſenſibly diminiſhed, and her ſenſes were obſerved to return." Dr. Beddoes, ſays, the fluid which was diſcharged was aſcertained, by careful inquiry, to be *mucus*, and not ſaliva. The prediſponent cauſes were ſuch as lead to Spaſmodic Aſthma; and both Dr. Darwin and Dr. Beddoes conſidered it to be an extraordinary inſtance of that diſorder.

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[*] Boneti Sepulchret. Anatom. lib. i. ſect. ii. obſ. 57.

[†] A patient of Mr. Baynton, of Briſtol. See Conſiderations on the Medicinal Power of Factitious Airs by Dr. Beddoes and Mr. Watt, P. IV. p. 53.

It is extraordinary from the very conſiderable excretion of ſerum; for a more moderate collection is to be ſuppoſed, where no excretion is obſerved; and we muſt be very inattentive in applying the function of abſorption to the diſorders of the lungs, if we give it no importance in ſuch caſes; but though I ſee in this inſtance very fortunate evidence of the cauſe of the diſeaſe, and ſuch as cannot commonly be expected to appear in a living ſubject, from the activity of abſorbing powers, yet the deſcription is not ſolitary in modern medicine. A ſimilar caſe is to be ſeen in the works of Alex. Munro, ſen.[*] in which a ſimilar fluid was diſcharged from the lungs, but its accumulation had been more gradual, and the irritability of the habit was not ſo deficient as in the female patient.

We ſhall find alſo, by going farther back, that Cælius Aurelianus[†] makes this exceſs of mucous fluid a diagnoſtic in the worſt caſes of Aſthma; and his reference to the moſt violent ſtate of the diſorder takes away all doubt of the appearance belonging to that form which is called convulſive. After mentioning the common ſymptoms in which are included wheezing, a cough dry, and then moiſt, ſpittings thin and frothy, and afterwards more thick and viſcid, he proceeds to ſay, "At ſi gravior impetus ſuperpoſitionis[‡] "fuerit, ora ægrotantium liveſcunt, et quidem "excluſo per nares humore mucilento, relevantur, "atque præfocationis carent metu, quod non "aliter cedit, etiamſi per oculos lacrymarum "fuerit fluor."

It is known with what energy the entrance of a ſingle drop of fluid would be reſiſted by the paſſage of the larynx, yet the inſidious entrance of ſerum into the veſiculæ is not productive of ſuch acute diſtreſs. That it may be borne in theſe cavities without inſtant death, when it has taken poſſeſſion, is proved by Dr. Goodwin. He poured water through an opening into the trachea of a cat: the experiment induced great difficulty of breathing, and a feeble pulſe; but the animal recovered, in repeated inſtances, from the ſudden impreſſion, to a ſtate of ſeeming eaſe.*

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[*] Works of Alex. Munro, ſen. p. 604.

[†] Morborum Chronicorum. Lib. iii. cap. 1.

[‡] Superpoſitionis, i. e. *Paroxyſmi.*

Dr. Goodwin finiſhed his experiments on cats by deſtroying them after a few hours. It would have been more ſatisfactory to have heard what ſymptoms appeared in a longer time; with this view I made the following experiment, which, with ſome modifications, was repeated on cats. Theſe animals are more tenacious of life than moſt others; and I found that they would take a greater quantity of fluid into the lungs, without immediate ſuffocation, in proportion to their bulk, than the dog.

I confined a dog in an erect poſture, and with the aſſiſtance of an ingenious friend, opened the trachea, and poured in four ounces of ſerum of cow's blood, warm; the paſſage was then properly cloſed. The dog was ſet at liberty within the bounds of a kennel, three feet by four, and open to the air in the front; he was affected with great difficulty of breathing, lay down panting, but ſuddenly aroſe with great emotion, and continued on his legs, with quick reſpiration, for ſome time. The diſtreſs gradually diſappeared in four hours; but he refuſed food, and appeared to ſleep. In fixteen hours he became unruly, and made violent efforts to releaſe himſelf: broth with oatmeal was given him, which he at firſt took with eagerneſs, but he ſoon left off eating, and was as reſtleſs as ever; his reſpiration was very laborious, and his eyes were ſuffuſed with water; the floor of the kennel was very wet, and I obſerved that he paſſed urine. After this ſtate had continued till the twenty-ſixth hour from the operation, with more or leſs Dyſpnœa and anxiety, he became much more quiet: his breathing in thirty-four hours appeared to be natural; but he then began to rub his neck, and ſcratch the wound. It was ſoon perceived that a great inflammation was come upon the integuments; and from the trouble which the animal gave, and the pain he was in, I directed him to be ſtrangled. Upon opening the lungs, there were collected one ounce and a half of fluid, which was much more ropy than the ſerum poured into the trachea; two ounces and a half, with any ordinary mucus natural to the cavities, had therefore been abſorbed, or exhaled, in the vapour of the dog's expirations.

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* Connection of Life with Reſpiration, p. 17.

It appears by the experiments of Dr. Hales, that water poured into the wind-pipe may paſs through the bronchia into the pulmonary artery;

but in the reverſe direction the paſſage of this fluid is ſo free, as to run from the artery into the air veſſels four-fifths faſter.

Serum of a hog's blood was afterwards tried, and it paſſed from the pulmonary artery moſt freely into the bronchia, but not into the veins.

But though ſerum paſſed with this facility from the arterial capillaries into the air pipes of the lungs, and doubtleſs with greater eaſe after death than in a living ſubject, it was found that globules of red blood would not paſs through theſe exhalent mouths into the veſicles, though conſiderable force was made uſe of.*

Hence Dr. Hales infers, that ſome Aſthmas may ariſe from the effuſion into the veſicular cavities.

"When we ſee," ſays this philoſopher, "how "freely the ſerum paſſed from the pulmonary "artery into the cavity of the veſicles and bron-"chia, it is no wonder that ſo great diſcharges of "humours are often made through the ſame paſ-"ſages, when the blood is much diluted by being "in colds ſurcharged with too much obſtructed "perſpirable matter, or otherwiſe diſordered: "hence alſo ſome Aſthmas have their origin."†

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* Hale's Statical Eſſays, Exper. xi. &c.

† Statical Eſſays, Vol. II. p. 88.

SECT. VII.

Floyer, Hoffman, and Cullen, on Aſthma.—Deſcription of the diſeaſe by Aretæus.—The capillary exhalents of the lungs unlike convoluted glands.—The uſe and indication of Convulſive Reſpiration.—The convulſions may remain after the irritation is removed.—The effect of frequent recurrence of Spaſm diſcovered by analogy of irritation ſituated in other organs.—Effect of irritation applied to different parts of the pulmonary ſyſtem.—Diagnoſtic Symptoms.—The Difficulty of breathing.—Cough.—Straitneſs.—Wheezing.—Relief from diſcharge of mucus.—A perſon recovered from drowning preſents an explanation of wheezing in Aſthma.—Objections to the Theory of Spaſmodic Conſtriction.

THE writers of authority, who ſucceeded Willis, have involved themſelves in conjecture. If we are to believe them, the nerves have been implanted in the animal ſyſtem, to remind man of his misfortunes, and to betray the œconomy of life into perpetual derangement, and torments ſcarcely to be endured.

Sir J. Floyer ſays, "the Periodic Aſthma depends on the conſtriction of the bronchia and " bladders of the lungs, by windy ſpirits:" as this ſtate had never been proved, it might very properly have been neglected, till a well digeſted examination of real appearances had been found inſufficient to explain the cauſe, or to afford indications of cure. He did not, however, omit to remark the exceſs of contraction in the reſpiratory muſcles of the breaſt and abdomen; and thus far he was conſiſtent with his own injunctions to ſucceeding phyſicians, "of deſcribing all ſenſible phænomena."

It appears a difficult taſk to avoid inconſiſtency, when this plain ground of *viſible effects* is deſerted, and the mind of the philoſopher, impatient of ſlow progreſs and careful induction, launches into hypotheſis.

The doctrines of Floyer, Hoffman, and Cullen, on the proximate cauſe of Aſthma, are now accepted without much debate, as affording the eaſieſt ſolution of the ſymptoms; and if the practice in treating it had been ſucceſsful, it would be at leaſt uſeleſs, if not invidious, to condemn critically the principles on which it was purſued; we have, however, a confeſſion of the greateſt weight to raiſe the ſcepticiſm of practitioners. No agent has yet been diſcovered, which, in the opinion of Dr. Cullen, can certainly remove Aſthma; and we may therefore rationally object, that the cauſe aſſigned by the Profeſſor is no proper direction to a cure, and may be even doubted in its exiſtence. As this writer has taken Floyer and Hoffman for his authority, and given the laſt finiſh to their theories, it may be ſufficient to make ſome remarks on his opinions.

I ſhall, however, obſerve, on Hoffman, that whatever may be his theory, his deſcriptions of the Humid, Flatulent, Spaſmodic, Hypochondriac, &c. point out cauſes of irritation in common to all the ſpecies, and producing the ſame effects in greater or leſs degree. He admires the deſcription of Aretæus with great reaſon, and even accepts it as his text in explaining the diſeaſe. This accurate writer did not omit to mark the expectoration of *frothy aqueous matter*; finally, in a fatal event, *ſuffocation*; in a fortunate one, *free and moiſt expectoration, with copious urine and watery ſtools.*[*]

Aretæus informs us, that the diſeaſe terminates in ſuffocation generally, not often in recovery. From this it is probable, that he applied the phænomena of Aſthma where they would uniformly appear, in diſeaſes of great irritation and oppreſſion of the pulmonary organ; for the account before us muſt embrace many caſes of ſtronger influence on the actions of life than thoſe which the generic term of the preſent day is made by noſologiſts to comprehend; though it comply ſtrictly with the natural fact, as is proved by the caſes in the laſt ſection.

Cullen conſiders the diſeaſe to be without a *manifeſt cauſe*, but has marked for a diagnoſtic the afflux of ſerum to the lungs in the following words: "Cum ſputo muci ſæpe copioſo."

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[*] Aretæus, Lib. iii. cap. 11.

It is obvious, that mucus could not have been expectorated without a previous ſecretion of ſerum. But as this mucus is copiouſly diſcharged, the effuſion of ſerum muſt have been conſiderable: it may be therefore proper to enquire in what ſtate of the lungs ſuch an effuſion can take place. It is known that the glandules of the trachea and bronchia are ſubject to inflammation, and that in Catarrh an excretion of mucus is conſiderable from this condition of their veſſels; but practitioners have generally teſtified, that pyrexia and ſymptoms of inflammation are not preſent in Spaſmodic Aſthma.

We muſt then look farther for the ſource of this copious ſecretion, and we ſhall find it in the veſſels with exhalent orifices at the extremities of the air pipes: the conſtruction of which is not complex like that of the mucous glandules; and they have not follicles in which they may depoſit their lymph till it be excreted. There are many reaſons for this being the principal, if not the only reſervoir, for the copious expectoration in Aſthma.

In conſequence of the condition of the habit in Aſthma, the matter of heat is not given out in this as in other inſtances of glandular ſecretion. The capillary veſſels are here paſſive; and, inſtead of exhaling a thin vapour, permit lymph to paſs without contracting ſo narrowly as to detain the groſs part of the current.

There is as little difficulty in aſſenting to the poſition of a torpor* of theſe capillary extremities, as to their encreaſed activity. In one caſe we muſt allow them a power of contracting, greater in proportion than that of the trunks from which they proceed; and in the other leſs. The latter ſtate is as conſiſtent with phyſiology as the former, and each may exiſt in different habits.

The exquiſite labour of reſpiration is conformable to animal laws under the impreſſion of this fluid, though it may ſeem to counteract its own purpoſe; but, in the early period of the complaint a quickneſs of reſpiration precedes the paroxyſm that the expirations may quietly carry off, in vapour, the ſerum from the cavities: the action of the abſorbents is quickened, it is probable, in the ſame proportion, and by the united powers of theſe inſtruments, if they be equal to the taſk, the balance may be reſtored between abſorption and exhalation. If this object be not accompliſhed, the energy of reſpiratory action will take place. It is the *Difficultas Spirandi* of Cullen,† which is repeated at intervals till the indication which it affords is anſwered, or the powers of the ſyſtem are exhauſted by the effort.

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* *Torpor* and *Quieſcence* appear to me properly expreſſive of the condition of a capillary veſſel, which is not irritated to contract by its contents; but I am not certain that my application of theſe terms correſponds with the meaning of the learned author of Zoonomia, who introduced them.

† See p. 5.

In the ſame manner Acrid Bile in the inteſtines occaſions an increaſed periſtaltic motion, and if it be not diſcharged from the bowels by their natural action, an inverted motion may ariſe, equally counteracting the means of relief, as the violent actions in Aſthma. Ileus is then produced, where leſs ſenſibility of injury, and leſs exertion to remove it, might have been followed by a regular diſcharge of feces.

In menſtruation and in parturition, a ſimilar exceſs of muſcular contractions frequently oppoſes the diſcharge which nature intends, and this muſt be moderated before ſhe can accompliſh her purpoſe.

We ſee then that the actions called *Difficulty of Breathing* naturally follow the obſtructed ſtate of the lungs. We ſhall next conſider how this ſtate may occaſion the other ſymptoms.

Irritation produces, in the pulmonary ſyſtem, effects different in quantity and manner, according to the part of the organ on which it falls. If a drop of the moſt limpid water fall into the larynx, it excites a more violent cough than the effuſed ſerum in the veſicles at the extremities of the wind-pipe. This ſhews the difference between a catarrhal cough and an aſthmatic one, the lymph accumulated in the veſicles is rather oppreſſive than acrimonious, and the ſenſibility of their membrane is leſs than that of any part of the bronchia and trachea. But beſides the veſicle being leſs ſenſible of irritation, it cannot collapſe in the attempt at expiration from its cavity being filled with lymph, which is the true cauſe of a paroxyſm beginning with *Little or No Cough*, and that ſeemingly impeded; but after the fluid has been leſſened by abſorption, ſtill more may be diſcharged in the vapour of expiration, and the elaſticity of the bronchia being thus reſtored, the much-deſired *Spitting of Mucus* may take place.

By the ſame ſtate of the lungs we may account for the *Straitneſs* and *Anxiety*. The veſiculæ are occupied by lymph; the bronchia are ſtraitened by the ſame matter in a more viſcid ſtate; the diaphragm cannot deſcend as it uſed to do, on account of the reſiſtance of the ſtomach diſtended with flatus, and the trachea is probably narrowed by the preſſure of the œſophagus, affected like the ſtomach: the external reſpiratory muſcles then endeavour to dilate the thorax, by lifting up the ribs and ſternum, but cannot accompliſh the object of filling the air cavities thus obſtructed, or forcing down the diaphragm, which, by its own contractions, had been unable to conquer the reſiſtance of the ſtomach: theſe real *obſtacles to a free and full inſpiration, equally prevent a free and full expiration** which cannot take place till the veſicles collapſe; and we have therefore no neceſſity of appealing to a Spaſmodic Conſtriction of the bronchia, till that ſtate be made more certain.

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* Cullen's Practice MCCCLXXXIV.

Floyer obſerves, with regard to the *ſtraitneſs*,* "that it does not depend on a great quantity of "phlegm, becauſe the lungs do not appear to be "much oppreſſed with phlegm before the fit; "and at the end of the fit the ſtraitneſs goes off, "before any conſiderable quantity is ſpit up:" but though we have accounted for the ſtraitneſs by the exiſting ſtate of the ſtomach, as well as of the lungs, I believe the laſt to be the principal cauſe, notwithſtanding the remark of Floyer; for there muſt be a point of time when the ~~ſilent~~ activity of the abſorbents has leſſened the quantity of ſerum collected in the air cells, and a degree of oppreſſion being taken off at that time, ſome returns of action in the bronchial rings and veſicular membranes, will be obtained; relief may then be perceived in the breaſt before excretion of phlegm takes place, but not before it has been reduced to a quantity which may be controuled, and expectoration then partially proceeds with critical relief to the patient.

The *wheezing* is a ſymptom united by Cullen, with the ſtraitneſs and anxiety; but in addition to the obſtruction of the tubes which admit and diſcharge air, we are not to forget the diſtention of the œſophagus, which is ſo conſiderable in hyſterical patients, and may prevail in all dyſpeptic caſes. If the trachea be compreſſed by any cauſe, wheezing will be the effect. In hyſteria it may be produced by this diſtention, though lymph had been effuſed, and the ſpitting prevented by active abſorption; and this conſideration may anſwer the remark of Floyer,* that "wheezing "does not depend on phlegm, becauſe the hyſ-"teric, who have no phlegm, wheeze very "much."

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* P. 7.

Wheezing and ſtraitneſs of the breaſt very frequently remain in greater or leſs degree between the fits, when the convulſive actions of the muſcles have ſubſided, which ſhews the inadequacy of a Spaſmodic Conſtriction as the cauſe, ſince no one is ready to aſſert the conſtancy of ſpaſm, without relaxation for a long period. The wheezing generally continues through the diſeaſe, gradually becoming leſs, till the ſecretion of lymph is reduced to a regular quantity, and the œſophagus no longer compreſſes the trachea, indigeſtion being removed, when it ceaſes.

To confirm this explanation, we find the ſymptom in Phthiſis attributed to the mucus or pus ſtuffing the trachea.† Wheezing is the ſame ~~found~~ sound in Phthiſis as in Aſthma; but the obſerver was not biaſſed by authority to aſſign it to ſpaſm.

We alſo ſee it accompany the condition of a perſon recovering from ſuſpended animation after water had been received into the lungs. Dr Goodwin ſays, "a difficult and ſtertorous reſpira-"tion is obſerved. This inconvenience ariſes

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* P. 43.

† White on Phthiſis Pulmonalis.

" from ſome water ſtill remaining in the lungs, " which will be gradually evaporated by the ex" pired air."*

As to a Spaſmodic Conſtriction of the bronchia, which, in the opinion of Cullen, is the proximate cauſe of the diſeaſe, there are many objections to be oppoſed to this theory.

1. Dyſpnœa has the ſame appearance to an obſerver as Aſthma, only more conſtant; and Cullen aſſigns to it the ſame cauſes as to Continued Aſthma: if therefore this affection can exiſt without conſtriction of the bronchia as a proximate cauſe, ſo may Convulſive Aſthma.

2. The ſtraitneſs of the breaſt, ſome dyſpnœa, and wheezing, remain between the fits in many inſtances, which ſhould prove the preſence of a Spaſmodic Conſtriction, though this ſtate by the laws of animal life cannot be permanent.

3. This continuance of ſymptoms between the fits is acknowledged by all writers, and particularly thoſe ſymptoms which are moſt neceſſary to prove the ſpaſm of the bronchia, as wheezing and ſtraitneſs.

4. The ſpaſm is ſaid to be readily excited by " Turgeſcence of the blood, or other cauſe of any " unuſual fulneſs and diſtention of the veſſels of

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* Goodwin on Animal Life and Reſpiration, p. 118.

" the lungs."* ; in this caſe Dyſpnœa would be more certainly attended by wheezing than Aſthma, which is not allowed, nor is Dyſpnœa ſaid by the profeſſor to be owing to ſpaſm of the bronchia.

5. A fit of Convulſive Aſthma of this ſpecies cannot be ſtopped by four grains of opium, which would probably be the caſe if it depended on ſpaſm only.

6. In Catarrh and Phthiſis a ſpaſm of the bronchia is not affirmed, though the material continually diſcharged may be ſuppoſed to irritate, and in fact does bring on laborious breathing occaſionally.

7. The Conſtriction has never been ſhewn by diſſection; but in caſes of vomicæ, where the lungs had been much irritated, it has been diſcovered by diſſection, that the "*branches of the* "*trachea are never in any degree contracted.*"†

8. Where irritability is not worn out, the act of dying is attended by the ſame muſcular efforts and uneaſineſs of the breaſt as the paroxyſm of Aſthma; but no conſtriction of the bronchia has been afterwards diſcovered, which might be expected, if it were a part of the laſt condition of the lungs.

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[*] Cullen's Practice MCCCLXXXIV.

[†] Dr. Stark's works, p. 28, 29.

Since univerſal relaxation of the body is not a conſtant effect of dying, as may be proved by many inſtances.

Laſtly. The ſuppoſed cauſe has never indicated a ſucceſsful practice, for Anti-Spaſmodics have only been uſeful in the fourth ſpecies; and in many caſes the actions of the external muſcles have been taken for the evidence of conſtriction, under the confuſed term of Difficulty of Breathing.

It is not, however, intended to deny the poſſible exiſtence of this ſpaſm, but to ſtate the imprudence of depending upon it in the practice. If it be neceſſary to the pathology of the diſeaſe, it ſurely may be better defended as a conſequence of the effuſion, than the effuſion can be ſupported as the effect of the conſtriction.

SECT. VIII.

Aſthma compared with other diſeaſes, bearing analogy in their cauſes.—Obſervation on the Humoral Aſthma.—Catarrh.—Phthiſis.—Aſthma, Lethargy, and Apoplexy,—The intercurrence of theſe affections.—Aſthma is a temporary Dropſy, diſtinct from hydrothorax and anaſarca of the lungs.—Aſthma, Dropſy, and Inſanity.

ASTHMA is ſo ſtrongly marked, that there can be little difficulty in knowing the diſeaſe; yet it will elucidate the ſubject, to ſhew its diſtinction from ſome other diſeaſes to which it may bear an analogy in its cauſes and effects.

Defluxions on the upper part of the lungs and Sneiderian membrane are uſually inflammatory affections of the mucous glands which line the paſſages of the noſe, fauces, and trachea, as far as its diviſions, and poſſibly lower in the breaſt, but not extending to the extremities of the air pipes.

The catarrhal diſpoſition is very frequently followed by Aſthma, becauſe repeated inflammation of the capillary veſſels and mucous excretories, may induce, in ſome habits, a loſs of tone, which may prevent their reſiſtance to a circulatory impulſe even leſs than healthy, and ſubject them to the influence of exciting cauſes of little force in compariſon with what they formerly ſubmitted to. For this reaſon elderly perſons have their natural excretion of mucus much more copious, as they may have been more affected by catarrh, and they are accordingly more liable to Aſthma. If inflammatory diſpoſition be not wholly loſt in theſe perſons, by the progreſſive debility of the veſſels of the lungs, Peripneumonia Notha will be the character of the pulmonary diſeaſe, attended often with great danger.

I am aware that this ſpecies will be deſignedly confounded by many reaſoners with the Humoral Aſthma; but it is time that the diſtinction of *Humoral* and *Convulſive* ſhould be better underſtood. If mucus be diſcharged in greater quantity in one caſe than in another, the reſpiratory actions being the ſame in both, there is no good reaſon for calling one only Convulſive. Is not every Humoral Aſthma Convulſive? If the unfortunate patient have ſo little irritability as not to be excited to cough and expectorate, the phlegm muſt ſuffocate him, if the abſorbing veſſels do not carry it off: and this proceſs is attended by Convulſive reſpiration. But though the Humoral muſt be Convulſive, the Convulſive Aſthma is not always Humoral; for we ſhall ſee that irritation may exiſt in a more ſubtle form than lymph.

It is conſiſtent with the rules of the animal œconomy, that Catarrh ſhould not be indicated by thoſe violent contractions of the muſcles of reſpiration which take place in Convulſive Aſthma.

Fever attends both Catarrh and Phthiſis; and we may obſerve, though we cannot aſſign a reaſon for the fact, that if fever ſuperſedes, it generally terminates convulſive motions.

If Catarrh occaſionally lead to Aſthma, it ſtill oftener brings on *Phthiſis*, a diſeaſe which depends on a ſtate of the lungs, oppoſite to that which permits ſerous effuſion.

In Aſthma, an exceſs of blood in the pulmonary veſſels may very probably precede the exhalation of the finer part into the veſiculæ and bronchia; this plethora is local, ariſing from the relaxed texture of the coats of the veſſels, and relieves itſelf by effuſion.

In incipient *Phthiſis* the arterial impulſe is more conſiderable than in health, but the pre-diſpoſition of the pulmonary veſſels is not favourable to a relief by effuſion, till the fever has acquired ſtrength, and coagulable lymph inſtead of pellucid ſerum comes to be effuſed.

It is therefore to be allowed, that there is a pre-diſpoſition, in conſequence of which inflammation will affect the arterial extremities, and produce Phthiſis, as doubtleſs there is a pre-diſpoſition leading to that atonic ſtate of the vaſcular pulmonary ſyſtem producing Aſthma.

There may be alſo an intermediate ſtate, in which a balance is preſerved between the criſis of inflammation ſealing up the orifices of the arterial exhalents, and their diſtention ſo gradually acquired as to permit the eſcape of the finer fluid, and conſequent relief of arterial fulneſs; but it is probable that this balance cannot be long adjuſted where the pre-diſpoſing cauſes have had a conſiderable influence, and that if the exhalents do not dilate ſoon in conſumptive habits, Phthiſis muſt take place; and in perſons of an oppoſite conſtitution, which I conceive is favourable to Aſthma, the effuſion of lymph into the veſiculæ and bronchia will determine, in no long time, the future character of the pulmonary diſeaſe.

Lethargic affections have been conſiderably allied to pulmonary complaints in the conſideration of many authors; ſo much ſo, as to create a queſtion if the cauſe of lethargy did not exiſt in the lungs. Hippocrates ſays, "lethargic diſeaſes are the "ſame as peripneumonic, and not altogether diſ- "ferent from the humid peripneumony." (Peripneumonia Notha.) Some of his commentators have even defended this opinion by the practical remark, that lethargy is critically relieved by expectoration of purulent or ſerous fluid.

The lethargic ſymptoms in Aſthma and Peripneumony are ſufficiently accounted for by the interruption to the courſe of the blood from the right ſide of the heart to the left, obſtructing the influx of venous blood from the head. The natural conſequence in bad caſes of Aſthma is Apoplexy.

Aſthma being thus occaſioned by ſerum in the veſiculæ, may be conſidered as an *Hydropic Diſeaſe*; but it is obviouſly diſtinct from Hydrothorax, in which the water is collected in the ſacs of the pleura, or cellular texture of the lungs. In each ſituation it will occaſion dyſpnœa, which, though ſubject to exacerbations, from accidental cauſes, will not put on the form of Periodic Aſthma.

We have ſufficient teſtimony of the connection of Aſthma with Dropſy in the hiſtories of practical authors, frequently pointing out the intercurrence of ſymptoms and changes of one diſeaſe into the other, when Aſthma has been of long ſtanding: ſome proof of this is contained in Sect. VI. of this Inquiry.

Hoffman and Willis have particularly noticed the hydropic appearances of the feet, and the tendency to general dropſy in Aſthma: and the obſervation of theſe authors is ſupported by that of other practitioners.

Sydenham opens his treatiſe of the Dropſy, by ſtating the firſt ſymptom of that diſorder, to be the ſwelling of the legs, and pitting of the ancle by preſſure of the finger: but this is not ſo certain a ſign in women as in men; nor even in the latter is it to be conſidered as an abſolute certainty of the diſeaſe having commenced. He then proceeds with the following obſervation:

"Etenim cum ſenex quiſpiam, habitu corporis "paulo pleniori præditus, *Aſthmate* jam a multis "annis laborans, ab eodem derepente, idque "hyemis tempore, fuerit liberatus, mox ingens "tumor muſculos tibiarum occupabit, Hydropicorum tumores æmulans, qui hyeme etiam "magis quam æſtate, tempeſtate magis pluviâ "quam ſerenâ, pariter invaleſcit, et tamen ſine "quovis incommodo inſigniori, eundem ad labitinam uſque comitabitur. Quo non obſtante, ſi "generaliter loquamur, ſuræ et tibiæ intumeſcentes, etiam in viris, pro ſigno ſupervenientis "hydropis habendæ ſunt; maxime ſi ita affecti "ſpiritum ægrius ducant."*

This ſagacious obſerver might have attributed the ſwelling of the legs, with great truth, to hydropic effuſion in the Aſthmatic, as well as in other caſes; and the ceſſation of the Aſthma when theſe ſwellings commenced, ſeems to corroborate, beyond diſpute, the theory, that both affections depended on one cauſe. The ſwelling was larger in winter than in ſummer, in moiſt weather than in dry. Alterations in the atmoſphere rapidly affect the Aſthmatic, and change his habit from a perſpiring to an imbibing ſtate, and whether the aqueous collection ſtagnate in the veſicles of the lungs, or be taken up by the abſorbents, and be again effuſed in the lower extremities, the identity of the cauſe is ſufficiently plain.

Inſanity ſometimes ſuſpends Conſumption, and Conſumption Inſanity: Aſthma, likewiſe, is ſucceeded occaſionally by Inſanity; probably from the turgid ſtate of the veſſels of the head in conſequence of the difficulty with which the right ſide of the heart propels the blood through the lungs to the left. In the hydropic diatheſis, ſo frequently accompanying advanced Aſthma, the diſeaſe of the head is ſtill more frequent.

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* Sydenhami Opera Tractatus de Hydrope.

The following two caſes* deſerve attention. In one, the patient had alternately Aſthma and Inſanity: in the other, there appeared Anaſarca and Inſanity at the ſame time. The treatment was ſucceſsful, though founded on the ſole indication of curing the Dropſy.

We conclude then, that Aſthma, Inſanity, and Dropſy, had the ſame cauſe; for, if Inſanity and Aſthma were one diſeaſe, and Inſanity and Dropſy were one diſeaſe, *Aſthma* and *Dropſy* muſt be one diſeaſe.

From a conſideration of the cauſes of Inſanity by the learned Dr. Arnold,† there can be no difficulty in aſſenting to the connection between theſe diſeaſes.

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* Withering on the Fox Glove, Caſes 24 and 34.

† Obſervations on the nature, kinds, cauſes, &c. of Inſanity.

SECT. IX.

Additional ſymptoms conſidered, and referred to the ſame cauſes.—Remiſſions of Convulſive Reſpiration.—Anxiety of the præcordia, and ſtraitneſs of the breaſt.—Itching of the neck and breaſt.—Obſcure heat without fever.—Dyſpepſia.—Head-ache, ſleepineſs, and flatulence.—Nocturnal acceſs of the paroxyſm.—The power of volition in ſuſpending Epilepſy and Aſthma.—Aſthmatic diabetes.—The union of oxygen with the blood, the abſorption of heat, and the diſcharge of aqueous vapour.—Deficiency of oxygen from the condition of the veſicles, and conſequent debility of the heart and arteries.—Polypi of the heart.—Syncope.—Irregular pulſe.—Coldneſs of the lower limbs.—The intermitting pulſe.—Correſpondence of the ſtomach and heart.—Expectoration of black mucus.—The blood ſaturated with carbon.—General remarks.

WE have ſeen in the preceding ſections, that the obſervations of modern phyſicians have ſtrengthened the authority of the ancient writers; and diſſections have confirmed their facts, as to the cauſe of one ſpecies of Convulſive Aſthma being an exceſs of ſerum in the lungs. The diagnoſtics* of Profeſſor Cullen, were only to be explained by tracing them to this ſource from which they naturally aroſe. But there are other ſymptoms, which, though not conſtantly meeting in the ſame paroxyſm, very generally attend the diſeaſe, and give additional ſupport to this proximate cauſe.

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* See Sect. vii. p. 80, 81, 82, 83.

Contracting muscles

The ~~Convulſive Actions~~, agreeably to the laws of the animal œconomy, have alternations of exertion and reſt. After a muſcle has been for ſome time ſtimulated to contract, a relaxation will ſucceed, though the ſtimulating cauſe may continue in force.* Happy is the Aſthmatic, who, in conſequence of repeated paroxyſms, is not influenced to obey the ſecondary law of habit; for contractions of the muſcles will continue at intervals, though the ſtimulus be even removed, as happens in teneſmus for ſome time after the excluſion of acrid excrement.†

The exacerbation will at leaſt recur every evening whilſt the irritation maintains its force, and the paroxyſm only declines as a portion of it is diſcharged, the remainder becoming leſs oppreſſive in the organ: thus, though the whole object be not gained till the paroxyſm ceaſes, ſomething is obtained at every remiſſion of theſe natural efforts.

Anxiety is owing to the difficulty attending the efforts of nature to remove an irritating offence.‡ If this exiſt in the cheſt, we ſhall be more ſatisfied with the pathology, becauſe it is here that the experience of phyſicians has long referred the perception called *anxiety of the præcordia*; differing very little from the anxiety belonging to Aſthma.

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* See Zoonomia, Vol. I. Sect. XII. I. 3.

† Ibid. Sect. XII. IV. 3.

‡ See Gaubii Inſtit. Patholog. Med. 686. 687.

An *Itching of the Skin*, of the breaſt and neck, is frequently a ſymptom in the aſthmatic paroxyſm, ſometimes preceding the violence of the fit, and generally declining as the agony of reſpiration increaſes; this may be the effect of ſympathy with the lungs and firſt paſſages. Irritating matter in the ſtomach is as probable a cauſe of the ſymptoms, as the obſtructing lymph in the veſicles, ſince hyſteric and hypochondriac patients, who ſuffer dyſpepſia, are very much affected with it.

The difficuly with which the venous blood is returned to the heart, from the right ventricle and the pulmonary artery being obſtructed, may be an additional cauſe of this affection of the ſkin.

There is frequently a remarkable *Perception* of *Heat*. This may have induced Floyer to ſpeak of fever in this diſeaſe, but an attention to the pulſe gives no countenance to the obſervation; as the quickneſs never amounts, in uncomplicated caſes, to one hundred beats in a minute; and the general ſtandard is from eighty to ninety. A great *deſire of cool air* alſo attends, probably occaſioned by a deficiency of oxygen, the means of obtaining which will be increaſed in proportion as the air is often changed, or more freſh air admitted.

Cloſeneſs is particularly diſagreeable to the Aſthmatic. "The patient," ſays Aretæus, "loves "walking in the open air, with his mouth open, "and is diſſatisfied with the largeſt houſe, which "ſeems too ſmall to breathe in."*

The ſenſe of heat through the body is not a conſtant ſymptom, for more frequently the lower extremities are very cold in the paroxyſm; and when the patient himſelf has the perception of heat in his external parts, there is no increaſe of temperature if the thermometer be applied to the ſkin. I have frequently conſidered this circumſtance, and I can only ſatisfy myſelf by attributing it to ſlowneſs of venous circulation in the ſuperficial veſſels, ariſing from the impediment to a free entrance of the blood into the right ſide of the heart, occaſioned by the compreſſion of the pulmonary veſſels.

Dyſpepſia is a condition of the habit which will be found always to have preceded this ſpecies of the Periodic Aſthma; compriſing the *flatulencies* of the ſtomach and bowels, the *pain over the head and eyes*, and the *ſleepineſs*.

The *Attack of the Paroxyſm in the night* is a peculiar feature, and gave riſe to the following ſuggeſtion of the ingenious Mr. Charles Darwin.

"†Do the periodic returns of nocturnal Aſthma "riſe from a temporary dropſy of the lungs, col"lected during their more torpid ſtate in ſound

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* Aretæus, Lib. iii. Cap. 11.

† Vide Zoonomia, Sect. XXIX. Vol. I.

" ſleep, and then re-abſorbed by the vehement " efforts of the diſordered organs of reſpiration, " and carried off by the copious ſweats about the " head and neck."

The copious ſweats about the head and neck are ſo uncommon as only to be ſeen in very groſs ſubjects, and ſuch as are affected with that form of Aſthma, called Humoral, which the ſpecies now treated of embraces.*

The muſcles ſubſervient to reſpiration have been ſaid by anatomiſts to be in ſome meaſure influenced by volition, and on this account they have long ſince diſtinguiſhed them as having a mixed motion, that is, partly voluntary, partly involuntary: if this be the caſe, reſpiration will be performed in the moſt perfect manner when neither of theſe powers is deficient, and in proportion as one is feeble, the function will be ſerved with leſs energy.

But the paroxyſm comes on after the patient has been abſorbed in ſleep, when volition being ſuſpended, irritation is to perform the whole duty. Effuſion of ſerum in the veſiculæ having previouſly taken place, if reſpiratory action be now diminiſhed, that moment when the oppreſſion of the ſerum can be no longer borne will be accelerated, becauſe leſs vapour will be exhaled in expiration, and the abſorbing veſſels cannot remove the inconvenience by their power alone.

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* In the ſecond volume of Zoonomia, the author modifies the aſſertion in the former, and thinks the Humoral and Convulſive Aſthma differ eſſentially from each other; the diſtinction, however, ſeems not to be very firmly eſtabliſhed. In fact, the abſence of mucus in ſome fits of the Aſthma, or the acceſs of the diſorder not occurring at the uſual periods, or at the cuſtomary hours, can ſcarcely ever be traced to two regular deviations; and it is acknowledged, that the humoral and convulſive are ſo intimately blended, as to make the taſk of finding a different cauſe for each much more embarraſſing than that of aſſigning natural laws as the reaſon of the occaſional abſence of one or more of the common phænomena.

When this period arrives, thoſe extraordinary efforts commence which conſtitute the paroxyſm of Aſthma, and are the *niſus* of nature to relieve herſelf of injury. This accounts for the circumſtance which Sir John Floyer relates; he could protract his fit by denying himſelf reſt: "* I have found "that by late ſitting up I have put by the fit for "a night or two; and I have found it commonly "neceſſary to riſe out of bed, eſpecially in the "ſummer time, and to ſleep in a chair the firſt "night of the fit. Two nights before the fit "Aſthmatics want ſleep frequently."† The fit threatens to take place two or three nights before the attack, and the power of volition prevents it at the expence of ſleepleſs nights, until the cauſe has proceeded to its *acmé*.

The ſame power is exhibited in Epilepſy as in Aſthma. A young man has been affected with Epilepſy from the age of thirteen to nineteen: it moſt frequently makes its attack in his ſleep, but before his ſenſes are gone he perceives it. If his ſleep be profound, and the head affected in the very firſt inſtance, he cannot ſtop its progreſs, though he has a confuſed ſenſe of his ſituation; but ſometimes he has ſufficient warning by numbneſs in his right hand, a tingling, or a pain, and in this caſe he ſtarts from his imperfect ſlumber, and uſing exertion of his muſcles, with attention of mind, he can ſucceed in ſtopping the fit, even after the attack is begun. This inſtance of Epilepſy is marked with irritation in the ſtomach; a load of viſcid phlegm is perceived to oppreſs that organ, and ſtrong emetics have occaſioned its evacuation in large quantities, with temporary relief.

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* Treatiſe on Aſthma, p. 94.

† Ibid. p. 94.

But the paroxyſm does not always come on in ſleep, for after frequent attacks, a period of return is introduced into the habit, which becomes part of its œconomy, and is too powerful to be counteracted by volition preſerving all its activity. Here the ſame force of habit operates which influences the diſorders of the body in other inſtances, even after the cauſe which firſt excited them is entirely removed.

The *Diabetes* in this ſpecies of Aſthma may be properly attributed to the Hydropic Diatheſis of the body, in which an effuſion from the exhalents of the kidneys may be expected to accompany a ſimilar effuſion from thoſe of the lungs.

It appears alſo, that the arterial exhalents of the kidneys may be relaxed by the ſudden impreſſion of paſſions of the mind, as may be the caſe in Hyſteric Aſthma.

The tendency to diſcharge copiouſly watery urine, accompanies more or leſs all the varieties of Aſthma which make their attack periodically. The kidneys receive nerves from the intercoſtals, and thus we are led to a ſuppoſition of ſtrong aſſociation of actions in the kidneys, ſtomach, and lungs.

This diſcharge does not however appear to afford relief to the lungs in the paroxyſm of Aſthma. If it were uſeful, it would ſtill confirm the pathology here delivered: but it precedes or accompanies the paroxyſm inſtead of following it. It continues whilſt the exacerbations laſt, and is reduced to a healthy ſtandard when they finally ceaſe, the balance between exhalation and abſorption being then generally, as well as locally, reſtored.

In ſupport of this reaſoning, we find that the hydropic diatheſis cannot be concealed in the advanced ſtate of this ſpecies of Aſthma; for, by the teſtimony of every medical authority, it terminates very freqently in anaſarca.

But before that ſpecies of Dropſy comes to be ſuſpected, the exhalents of the kidneys permit the paſſage of great quantities of water, which, for ſome time may ſuſpend the effuſion in the cellular membrane, or cavities of the body. Thus does Aſthma connect itſelf with Dropſy by this intermediate link, as well as by the effuſion into the veſiculæ of the lungs.

Though this affection be in general temporary, yet its frequent recurrence with a degenerated condition of the fluids have often made it permanent, and by the teſtimony of M. Sauvage induced a true Diabetes.

The *Straitneſs of the Breaſt*, or ſenſe of uneaſineſs, which has acquired this term muſt be encreaſed in proportion as the cloſe application of oxygen to the pulmonary veſſels is diminiſhed. M. Lavoiſier proves, that of the oxygen which diſappears in reſpiration *four-fifths* are conſumed by a combination with the carbon of the blood, forming carbonic acid gas; the remaining *fifth* is either abſorbed by the blood, or, uniting with hydrogen, diſcharged from the blood, forms aqueous vapour.

It is alſo beyond a queſtion that a principal duty of reſpiration is to impart heat to the blood, and to furniſh it with the quality which oxygen poſſeſſes of ſtimulating the heart and arteries to more vigorous contractions.

Now Dr. Goodwin ſhews, by his experiments, that a fluid in the air cells, introduced by the act of drowning, is an important obſtacle to the union of oxygen with the blood, and frequently prevented the reception of its ſtimulus, by the efficacy of which the contractions were to be reſtored, in ſuſpended animation.

Can we then wonder that the Aſthmatic ſhould eagerly deſire an open expoſure and a change of air, ſince the condition of the veſiculæ, filled more or leſs with ſerum, oppoſes the ready combination of oxygen with the blood, by ab-

~~forbing~~ which, a proportionate degree of vigour would be acquired.

We have, therefore, experiment in ſupport of the cauſe here aſſerted, of ſome of the moſt remarkable ſymptoms which diſtinguiſh Aſthma. The accumulation of ſerum in the air cavities of the lungs may be productive, by its bulk, of uneaſy ſenſation; but, conſidering its influence more widely, it may be the cauſe of deficient contractions of the heart; the blood will then be delayed more in the ventricles and pulmonary veſſels, but particularly in the right ventricle; the current through thoſe veſſels being rendered difficult by compreſſion: hence *Polypi* have ſo often been diſcovered in the cavities of the heart and large veſſels of aſthmatic ſubjects.* The patient may, from this condition, be affected with *Syncope*, and *Irregularity of Pulſe*. The irritability of the heart being unequally excited, at one time, its contractions may be languid, becauſe the blood has leſs ſtimulating property; but occaſionally they may be energetic and ſtrong, from its feeling the excitement of uncommon diſtention.

The *Intermitting Pulſe*, which Floyer attributes to the conſtriction of the arteries, by circumvolving nerves, may naturally proceed from this condition of the heart.

There is alſo ſaid to be a ſtrong ſympathy between the ſtomach and heart, in which caſe the latter may be greatly influenced by Dyſpepſia, ſo prevalent in Aſthma.*

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* See Part I. Sect. III. p. 40.

Spitting of *Black Mucus* is a ſymptom often occurring, but not invariably, in Aſthma, as well as in the pituitous conſumption.

Amongſt the ſigns affording a prognoſtic of Conſumption, Morton places the expectoration of black and viſcid phlegm in a morning. He tells us, that it proceeds from the glands near the windpipe being filled with a black humour, a ſymptom common to ſcrophulous and ſcorbutic ſubjects, and indicating a probable conſequence of an Aſthmatic Conſumption.†

But theſe glands have not been diſcovered to communicate with the cavities of the windpipe or bronchia, and the mucus is therefore not coloured by an effuſion of their contents.

Yet they have been found, upon diſſection, filled with black matter. By the teſtimony of Morgagni, in three bodies out of four which he examined with this object in view, the black colour was diffuſed through the glands, and paper being rubbed over the diſſected portions, it aſſumed a ſooty tincture, not different from that of powdered charcoal diluted with a good deal of water.

He however denies, that the black mucus which is ſaid to be expectorated in certain caſes can have had a natural excretion into the trachea or bronchia, from theſe glands, but allows, that eroſion in diſeaſe may poſſibly have opened a paſſage.[*]

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* Vide Zoonomia, Vol. I. Sect. 25. alſo 23. 4. and 35, I. 4.

† Phthiſiolog. Lib. ii. Cap. ii. 10.

There is, therefore, an expectoration of black mucus, which could have no other ſource than the exhalents of the veſicles, or the glandules which open into the trachea and bronchia; and there is alſo a ſimilar black appearance in the bronchial glands which are not connected with the air cavities. It is alſo obſervable, that, by Morton's teſtimony, ſcorbutic habits are very liable to the ſymptom, and that it leads to Aſthmatic Phthiſis.

Dr. Willis remarked, that ſome patients had frequently in the day, but particularly in the morning, "Sputum inſtar atramenti nigricans."[†] Floyer[‡] deſcribes this ſymptom as belonging to the Hyſteric Aſthma, as well as to the Periodic, and as giving the appearance of feathers; and Dr. Withers had obſerved it in many caſes.[§]

I have frequently remarked an expectoration of black mucus in Aſthmatics, when there could be no ſuſpicion of the rupture of any ſmall veſſels. I believe the material which colours the mucus to be the carbon of the blood, which in the healthy ſtate of the ſyſtem was exhaled in carbonic acid, the atmoſpheric air having been then properly decompoſed.

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[*] Morgagni de Cauſis et Sedibus. Epiſt. xxii. Art. 21.

[†] Willis Opera, Vol. II. de Phthiſi Pulmonali, p. 49.

[‡] Treatiſe on the Aſthma, p. 11—19.

[§] Withers's Treatiſe, &c. p. 8.

The habit of an Aſthmatic is generally diſtinguiſhed by cold extremities; and Dyſpepſia is accompanied with watery blood, and weak contractions of the muſcles. A prediſpoſition is exhibited in theſe circumſtances favourable to the opinion of Dr. Beddoes, that in Aſthma the ſyſtem is not ſufficiently invigorated with oxygen, a concluſion which we are led to by the ſtate of the lungs, particularly noticed in this Inquiry.

But by whatever means the prediſpoſition to Aſthma may be acquired, hydrogen holding carbon in ſolution predominates in the ſyſtem, and gives to the arterial too much of the colour and quality of venous blood.

An expectoration of this kind may be expected when a very conſiderable extent of the veſicular ſurfaces is covered from the contact of air by a coat of ſerum: but the prediſpoſition of the blood, which leads to the Pituitous Conſumption as well as Aſthma, may at all times favour the appearance; and, according to the teſtimony of Morton and Willis, the effect occaſionally takes place in both. In the ſpecies of Conſumption called *pituitous*, there are contra-indications, which, in its commencement, will not allow a certain prognoſtic of which diſeaſe it may finally bear the character—of Aſthma or Phthiſis.

If the mucus be not black, it may be pellucid, or yellow, accordingly as it has remained in the follicles of the trachea or veſicles more or leſs time previouſly to the diſcharge. If it be tinged with blood, it is apparent that the capillary apertures are ſo dilated as to permit red globules to paſs. If it have a ſaltiſh or ſweetiſh taſte, there muſt have been ſome blood in the maſs, and more heat than generally prevails in the lungs of Aſthmatics; and it is probable that ſpittings of this kind proceed chiefly from the follicles of the trachea, affected with ſome catarrhal inflammation.

Sleepineſs comes on ſitting, but not leaning backwards, according to Floyer. This is in the *acmé* of the paroxyſm, when the oppreſſion of the fluid is moſt conſiderable. In this ſtate a reclining poſture would make the inſpiration of air more difficult, becauſe the ſtomach and lower viſcera would preſs more againſt the diaphragm than when in their depending ſituation.

The neceſſity of an erect attitude is alſo owing to the paſſage of the blood being obſtructed through the pulmonary artery, occaſioning plenitude and delay in the right ventricle, and in courſe an oppoſition to the free entrance of venous blood from all parts of the body into the heart: in this ſtate of the ventricle and pulmonary veſſels, a reclining poſture, by impelling the circulation to wards the heart, muſt increaſe the anxiety, the ſtraitneſs, and the ſuffocative ſenſation at preſent ſubſiſting; ſleep will therefore be more oppoſed by the exertions of volition to preſerve reſpiration and life, than it will be promoted by the fulneſs of the veins of the head, and the debility and languor of the habit; which cauſes might produce lethargy, if a more powerful inſtinct did not avert their effect.

The *Pulſe* of an Aſthmatic is generally feeble; as the fit approaches a temporary increaſe of fulneſs and ſtrength may be ſometimes perceived in young ſubjects; but the indication is not to be depended upon; for, in the progreſs of the paroxyſm, weakneſs ſucceeds, with frequency, but the pulſations ſeldom exceed ninety in a minute.

When the pulſe is moſt frequent the mouth is moiſt, and there is often a whitiſh mucus upon the ſurface of the tongue. Thirſt ſeldom attends, either in the paroxyſm or in the intermiſſion.

The *Urine* is very pale and copious before the fit, and during its progreſs; it is alſo frequently copious and pale without the fit coming on, in conſequence of indigeſtion, to which the Aſthmatic is always liable. When the fit goes off, there is no remarkable depoſition in the urine, but it is generally in leſs quantity than is natural to health. If the urine be copious and pale, it is, I believe, never ſweet. In conſequence of the remark of Sauvage on Diabetic Urine, the water of an Aſthmatic has been taſted more than once, but it was always found weak, ſaline, and of no ſacharine taſte whatever.

The *Belly* of an Aſthmatic is ſeldom regular; when it has been ſo by cuſtom, I have generally found that it was lax. If the patient is bound in his body, it probably induces a fit; but this ſtate generally alternates with diarrhœa, and both may be attributed to the dyſpepſia of the firſt paſſages.

There is at the acceſs of the fit a remarkable action of the abdominal muſcles, and of all the muſcles which are in common uſe for the diſcharge of fæces. The patient finds it impoſſible to reſiſt the impulſe, and before he has much experience, flatters himſelf that the evacuation will be followed by relief. This effort to expel the contents of the bowels may be excited by their acrimony, as in the third ſpecies; but the muſcles which are ſubſervient to the diſcharge being employed in the exerciſe of reſpiration, it may not be diſtinctly known where the offending cauſe reſides, in the lungs, the ſtomach, or lower bowels: the reſult may, however, ſhew, that all theſe cavities have been offended; that only the ſtomach and bowels have been irritated, and the fit may be ſhort; or that the veſiculæ have been chiefly oppreſſed; and then the fit proceeds in a more regular manner, and terminates with expectoration of mucus to great certainty.

It has been obſerved, that a ſenſe of heat prevails ſometimes in the paroxyſm, affecting moſtly the trunk of the body; but the temperature is, notwithſtanding, low; nor does this perception ſo often occur as that of coldneſs.

The *Habit* of an Aſthmatic is generally cold, with the occaſional exception of a ſhort interval in the acceſs, when there is an increaſe of effort in the arterial circulation, which does not continue long. Dyſpnœa is not ſo likely to be marked with this prevailing ſymptom, as the regular form of Convulſive Aſthma.

If the bulb of a thermometer be put into the mouth of an Aſthmatic at the approach of a fit, the temperature will be ~~fonud~~ found lower than in the intervals. In the height of the fit I have found the heat of the exhaled vapour confined to the cavity of the mouth at eighty-two of Farenheit, when the ſame ſubject had, the day before, proved the temperature by this teſt to ſtand at ninety-ſeven.

Three hours before the death of an Aſthmatic,* the temperature within his mouth was reduced to ſeventy-three. I have often applied the thermometer, but it is impoſſible to know with how low a temperature a patient may recover.

If the ſtomach be full or empty, the inconvenience in the paroxyſm is almoſt equal; at leaſt, nothing can exceed the diſtreſs which the patient feels from a perfect emptineſs of that organ, occaſionally, after the remiſſion has commenced, and exerciſe is tried. If the ſtomach be loaded during the debility which it ſuffers in the paroxyſm, the conſequence is ſufficiently manifeſt: the middle road ſhould carefully be purſued.

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* See Sect. vi. Obſ. xii.

The Aſthmatic may ſuffer many or few fits in a certain time: Floyer ſuſtained thirty-ſix in the year; but ſome muſt have been of very ſhort continuance, probably excited by indigeſtion, and terminated when the ſtomach was relieved; for it is allowed, that, after repeated attacks, the habit of convulſive contraction of the abdominal and intercoſtal muſcles will be ſo confirmed, that convulſions may take place from trifling cauſes.

He obſerved, that the Periodic Aſthma was regular once in ten days; but that the Continued was uncertain. When the paroxyſm has come on ſo frequently as once in ten days, I have uſually remarked, that conſiderable Dyſpnœa has remained between the fits; and it always may be depended upon, that the longer and the more perfect an intermiſſion is, when the genuine Convulſive Aſthma is eſtabliſhed in the habit, the more violent will be the paroxyſm.

The *Mind* of an Aſthmatic is impatient, and he ſuffers much from oppoſition to his own method of management. After ſeveral acceſſions he has aſcertained modes of comfort and ſatisfaction, which the anxiety of his friends may impede rather than promote, by their ſolicitude and attentions: he therefore is irritable, and with difficulty reſtrains his diſpoſition to petulance. But, excepting in the exhauſted habit, vivacity and good humour never fail to return with the freedom of reſpiration.

The *Reſpirations* in the paroxyſm are more numerous in a given time than in health, a fact which ſtands in direct oppoſition to the authority of Floyer. I have reckoned from twenty to forty reſpirations in a minute, but they never exceed thirty without a very conſideable increaſe of frequency of pulſe, and a well-grounded indication, that the caſe is complicated with ſome pneumonic inflammation. In ſimple Spaſmodic Aſthma, however, the reſpirations are more frequent than in due proportion to the contractions of the heart: it is therefore extraordinary that Floyer ſhould ſuggeſt a contrary ſtate, which is not ſupported by any authority, except that of Zecchius, which he quotes: in oppoſition to which Willis deſcribes the reſpiration as "*crebra et anheloſa*;" and Dr. Stark obſerves, that patients in this diſeaſe commonly breathe "*thirty* or *forty* times in a minute, "and ſtill oftener after eating, or the moſt moderate exerciſe."

I hope the cauſe which immediately occaſions a paroxyſm of the Firſt Species of Aſthma is ſufficiently explained. We proceed next to the remote cauſes which ſupport the doctrine here delivered, as they naturally lead to the condition deſcribed in the preceding ſections.

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[*] Stark's Works, p. 43.

SECT. X.

REMOTE CAUSES OF CONVULSIVE ASTHMA.

The Prediſpoſing Cauſes.—*The Periods of life.—The ſex.—The temperament of Body.—Dyſpepſia.—Its conſequences. Effect of Dyſpepſia on the circulation and ſecretions.—General Debility of the ſolids.—Condition of the fluids.—Senſibility or irritability of the habit.—Lymphatic abſorption curſorily conſidered.—Its importance in the animal œconomy.*

IN purſuing our inquiry after the remote cauſes of that ſerous effuſion in the pulmonary veſicles, which has been deſcribed, we find a condition of the body which is liable to be excited by circumſtances internal and external. This is a *Prediſpoſition* to Aſthma; and thoſe circumſtances which are ſometimes internal, but generally occur from without, are *exciting cauſes* of the fit.

The *Prediſpoſition* is, of all the remote cauſes, moſt important, and claims particular attention.

Hippocrates* attributes to youth a ſtate of habit ready to ſuffer hæmoptyſis, inflammations, and fever; beyond this period the conſtitution is liable to be attacked by peripneumony, lethargy, and Aſthma. In advanced age difficulties of breathing, &c. come on, but this writer applies the word ασθματα to that conſtitutional affection which he aſſigns to manhood in the 30th aphoriſm, and δυσπνοιαι to that of old age in the 31ſt. And he alſo in the 26th aphoriſm includes ασθματα amongſt the affections attacking the body in the period before puberty.

The affection ſignified by ασθματα in this place is again attributed to puerile habits in another† by the ſame word.

Infancy and manhood were therefore eſteemed by him, the periods of human life prediſpoſing to this diſeaſe; old age makes the habit leſs irritable, and therefore leſs likely to aſſume the ſtrong convulſive contractions which may attend the other ſtages; but it does not follow that the contractions of the reſpiratory muſcles are not convulſive in old age, if difficulties of breathing, or δυσπνοιαι affect the ſubject, in conſequence of exceſſive moiſture offending the lungs. We have no alternative in ſpeaking of the nature of muſcular contractions, which are convulſive when they exceed the common purpoſes of healthy reſpiration: nor can difficulty of breathing be characterized preciſely in any other manner, than by the proportion of contractions which theſe muſcles undergo; though it may be allowed that a particular energy, which is not often to be expected in old age, is eſſential to the character of the Convulſive Aſthma of Modern Noſology, which is ſo far ſupported by the authority of the Greek Phyſician.

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* Hippocrat. Fœſii. Aphor. 29, 30, 31. Lib. iii. Sect. 7.

† Liber. de Aere, Locis et Aquis. Fœſii, Tom. i. p. 281,

Men are ſaid by many writers to be more generally affected with this diſeaſe than women, which may probably be the caſe, becauſe the female ſex are not ſo much expoſed to the application of exciting cauſes.

The *Temperament* which prediſpoſes to Aſthma is the *choleric*, as deſcribed by Profeſſor Gregory,* but it ſeems to derive its influence in this reſpect, from the diſorders of the firſt paſſages to which it is liable.

Perſons of this temperament are more ſubject to accumulations of blood in the pulmonary veſſels, and to be affected by ſudden impulſes of anger ~~paſſion~~ and emotion of mind, which readily occaſion an impetus in the circulation, overpowering the contractile tone of the exhalents. They have alſo too active a ſecretion of bile, which may occaſion irritation and heat at the præcordia, as it certainly is frequently the effect of high paſſions and a luxurious life. If to this ſtate be ſuper-added Dyſpepſia, the choleric temperament will be more influenced by the exciting cauſes of Aſthma than any other, and may be more generally obſerved to be ſubject to its attacks.

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* Conſpectus, Theoriæ Medicinæ, 929.

Wherever Dyſpepſia prevails, there ſhall we find a fruitful opportunity of exciting the paroxyſm of Aſthma; but this morbid debility of the ſtomach muſt probably concur with ~~accidental~~ other cauſes before the diſeaſe appears in the form of the Firſt Species.

After it has long had poſſeſſion of the firſt paſſages, the proper nouriſhment of the body muſt be conſiderably impeded, and the ſolids being weak, the fluids muſt be watery and poor. The temperature of the habit is then low and unfriendly to the promotion of new chemical affinities, by which oxygen and heat are imparted to the ſyſtem. A morbid ſtate is then productive of new diſorder, or it may be ſaid, that prediſpoſition is more confirmed, and more rapidly approaches the point to which it tends.

The ſtimulus of the blood will not excite the heart and arteries to vigorous action; the exhalents will not contract with healthy irritability, and an over proportion of water in the blood will make the exit of ſerum through their orifices more eaſy and copious.

There is, beſides, a mechanical effect from this relaxed ſtate of the firſt paſſages, which may ſuddenly induce the proximate cauſe of Aſthma. The ſtomach may be ſo diſtended as to fill a very conſiderable ſpace, which ſhould be allotted in inſpiration to the deſcent of the diaphragm: at the moment when that muſcle is excited to contract its fibres and become plane, that the veſiculæ of the lungs may be filled with new air, the bulk of the ſtomach may thus prevent the exerciſe of this function. The progreſs of the blood to the left ſide of the heart is then delayed in the pulmonary vein. The capillary orifices of the artery are dilated to relieve the branches of that veſſel, and a critical eſcape of ſerous fluid enſues. This occurs in veſſels which have coats not thin and tender, which prediſpoſes to Phthiſis, but relaxed and dilatable, which is part of the prediſpoſition to this ſpecies of Aſthma.

By this diſtention farther inconvenience follows, of the ſame kind; other veſſels are probably compreſſed, and the Aqueous Diabetes is produced. The duodenum, and more remotely the whole canal, ſuffers from the vices of the firſt digeſtion.

The motion of the blood is promoted both in the arteries and in the veins, by the action of contiguous muſcles. The blood returning to the heart by the Vena Cava, and its branches is moved by the action of the heart and arteries, and alſo by the contraction of muſcles which preſs the veins.

Preſſure from theſe cauſes, and ſubject by the rules of muſcular contraction to alternate relaxation, muſt determine the blood towards the heart, becauſe theſe veins are ſupplied with valves which forbid its progreſs in the contrary direction.

The lymphatic veſſels more numerouſly provided with valves have their action encreaſed by the ſame cauſes. When, therefore, we conſider the deficient energy of the heart and arteries, and the irregular contraction of the viſceral muſcles, in Dyſpeptic patients, we muſt allow a ſufficient cauſe for a ſlow progreſs of blood in the veins, and the conſequent turgeſcence of the arteries which ſecrete the urine, or, rather permit the thinner part of their contents to paſs off in quantities proportioned to the neceſſity of relief.

The Vena Cava paſſing through the Diaphragm, the free motion of that muſcle materially influences the return of the blood to the heart, and the circulation being impeded in the liver, from the languor of the veſſels which are to carry off the blood, hydropic effuſions may follow* in other cavities beſides thoſe of the lungs; accordingly we obſerve Dropſy of the Belly and cellular membrane to follow Aſthma from this mechanical cauſe, as well as from others that are well known.

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[*] Vid. Hoffman, Tom. iii. ſect. ii. cap. 2. p. 98. necnon, Tom. iv. Conſ. et Reſp. Med. Cent. 1. Caſus XCIII.

This Dyſpeptic ſtate of the ſtomach is ſo prevalent in a great majority of caſes, that it is difficult to ſeparate it, as a prediſpoſition or ſymptom of the diſeaſe in conſidering all. We may juſtly call it the cauſe of *one ſpecies*, but it will be found that none is clearly unconnected with flatulence, which, without any certain exception, makes part of the paroxyſm, or precedes it.

Sir J. Floyer conſiders this ſtate of the ſtomach as ſecondary to the ſtate of the lungs, and not as an occaſional cauſe, but the contrary order is more probable, ſince Aſthma ſeldom appears without having been preceded by Dyſpepſia, though the latter frequently occurs unconnected with Aſthma. The powers of digeſtion will certainly be additionally weakened whenever Aſthma is formed, and in this view Dyſpepſia may follow Aſthma; but it has previouſly been a cauſe of the diſeaſe, which reciprocally encreaſes the debility of the ſtomach, and is itſelf aggravated by it.

He remarks, notwithſtanding this opinion, that "a ſhort fit is accompanied only with wind and "ſpitting, and depending on diſorders in diet, "&c. and this was his Aſthma before it ſettled "into periods."*

The Œſophagus was found by Dr. Hales, very dilatable with a ſmall force of water or wind,† which leads to a concluſion that dyſpepſia may frequently diſtend the whole canal, and that it may produce wheezing where there is no obſtructing mucus in the air paſſages ſufficient to account for that ſymptom. Flatulence may force the ſides of the Œſophagus againſt the trachea, compreſſing the cavity of that pipe into a ſmaller area.

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* Floyer, p. 12.

† Statical Eſſays, Vol. II. p. 183.

Hales attributes the vertigo of dyſpeptic patients to the occaſional cauſe of Flatus in the Œſophagus, compreſſing the deſcending aorta, and by this means, impelling the blood for the inſtant towards the head.

The encreaſe of bulk which an Aſthmatic may occaſionally ſuſtain from this cauſe, will be according to the aliment which has been taken, ſome ſubſtances containing a greater quantity of fixed air than others; which air muſt be ſeparated by heat and fermentation, the natural conſequence of delay in a weak ſtomach. Pounded apples give out 48 times their own bulk.* A light atmoſphere, diſcovered by the ſudden falling of quickſilver in the barometer, may add to the influence of theſe cauſes by the compreſſion on the ingeſta being diminiſhed.

Dyſpepſia, as a ſymptom of Retrocedent Gout, Exanthemata, or Ammenorrhæa, may afford an obſtacle to freedom of reſpiration whilſt it continues; but the relaxed ſolids and watery fluids, are not part of its conſequences. The Idiopathic diſeaſe ariſing from a loſs of tone in the muſcular fibres of the ſtomach, may have depraved the digeſtion for any length of time, and general debility will be encreaſed in proportion.

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* Vide Dr. Hales' Vegetable Statics, p. 208.

The hydropic diatheſis may be expected to follow Convulſive Aſthma.

If this effect be not diſcovered ſo often in the lungs as in other cavities, this organ owes its greater ſecurity to the continued and inceſſant activity of lymphatic veſſels, and of reſpiratory motions which aſſiſt abſorption, in removing by vapour the encreaſing fluid. We have a dependence on this combined power, in proportion to the importance of the function to be preſerved by its efforts.

In the paroxyſm the ſurface of the body is univerſally pale, and the muſcles appear ſhrunk. The weakneſs of the heart and arteries, with a prediſpoſition of their contents to the character of venous blood, becauſe oxygen is deficient, ſufficiently account for both ſymptoms.

In this ſtate of the blood we need not foreſee worſe conſequences than uſually occur in the diſeaſe. Mr. Kite has proved, "that the left "ſinus venoſus, auricle and ventricle, do not "ceaſe to contract in conſequence of the phlogiſ-"ticated ſtate of the blood in their cavities."*

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* Mr. Kite's Eſſays and Obſervations on the ſubmerſion of Animals, &c.

Examples have been given in Sect. VI. of different degrees in the danger of the patient. In ſome ſubjects the effuſion was too oppreſſive to be diſcharged from habits of little irritability; in others, life was preſerved with difficulty, and the balance had been kept between death and recovery, with terrible uncertainty of which ſcale would finally aſcend. In theſe inſtances effuſion of ſerum had been ſudden and extenſive, excluding the further penetration of oxygen into the veſſels, but life was ſtill preſerved, till the irritability of the ſyſtem being exerted with energy, the bar was removed.

Though the blood have too great a proportion of carbon and hydrogen, yet we muſt not attribute the diſeaſe to this proximate cauſe, without conſidering the ſtate of the body which may occaſion it. Oxygen exiſts in ſuch large proportion as a component of the atmoſphere, that a deficiency of it in the blood muſt be referred to a peculiar derangement in the machine.

The habit of an Aſthmatic is affected, by apparently ſmall impreſſions on the nerve or fibre, whatever name this diſpoſition may have obtained; Mobility, Irritability, or Senſibility. The robuſt are unaffected by impulſes which the feeble or delicate may acutely feel.

This prediſpoſition is likewiſe more perceptible at one period of life than at another. It decreaſes with the progreſs of years, and is almoſt loſt in extreme old age.

It is as well deſcribed by the term *Irritability* as any other, and may be moſt clearly ſeen in the facility with which Convulſive Motions, after having been once excited, run into exceſs, or, which having ſubſided with their cauſe, are liable to return, upon much inferior occaſions, and even in ſome inſtances without a perceptible excitement.

Without this remote cauſe, the ſpaſmodic contractions cannot in ſome caſes be accounted for, and it ſeems to attend or precede Convulſive Aſthma from mucous irritation. This irritation may be removed, but the prediſpoſition remaining, the diſorder cannot be ſaid to be cured.

It may be ſuggeſted, that the ſerum collected in the veſicles, may be partly occaſioned by a paralytic ſtate of the abſorbents. A temporary weakneſs of theſe veſſels is not impoſſible, but the Pathologiſt muſt be unwilling to rely on the frequency of ſuch condition, becauſe Providence has, doubtleſs, deſigned them to relieve the diſorders which may occur to every other branch of the animal ſyſtem.

If, then, we are to conſider their paralyſis as a cauſe of the accumulated fluid in the veſiculæ, and of the aqueous diabetes which attends it, we muſt ſuppoſe a condition not likely to admit of the relief which ſo periodically ſupervenes in

Aſthma. If we ſuppoſe a rupture of a lymphatic branch, we infer a fixed and local cauſe of continued Dropſy; and if a ſpaſmodic conſtriction, the caſe is too uncertain and capricious to reaſon upon, and may ſo commonly occur, as to ſtand in oppoſition to the deſign of the lymphatics, whoſe office is that of the laſt guardian of the ſafety of the animal œconomy.

That the abſorbing veſſels are particularly eſſential to the preſervation of the air cavities of the lungs from obſtruction of any kind; muſt be concluded from their great number diſperſed in the pulmonary ſyſtem. "Next to the liver," ſays Mr. Cruikſhank, "the greateſt number of abſorbents has been found in the lungs."* Dr. Hales ſays, the velocity of the blood ~~of~~ in the lungs, is many times greater than in moſt other parts of the body. A remora in any of the veſſels of this organ, will therefore be in proportion, more productive of uneaſineſs than in any other; and effuſion from the exhalents, or rupture of the veſſels, according to the habit of their coats, will be a conſequence of a free return of blood from the right ſide of the heart to the left being obſtructed, ſooner than in any veſſels where the velocity of the blood is leſs, though thoſe veſſels ſhould be equally obſtructed; therefore effuſion in the veſicles muſt perpetually demand the abſorption of the lymphatics of the lungs, and unleſs that function be preſerved in healthy vigour more generally than a theory of paralyſis or conſtriction will ſupport, Aſthma muſt occur oftener than we find it, and be much more fatal in its reſult.

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* Anatomy of the Abſorbents, p. 196.

SECT. XI.

The Remote Cauſes *continued.—The* Exciting Cauſes.—*Alterations in the denſity of the air.—Effect of unuſual rarity.—Oxygen united to the blood in greater proportion as the preſſure of the atmoſphere encreaſes.—The rarity of the air on mountains and elevated countries.—An animal deſtroyed by exhauſtion of air.—An animal expoſed to accumulated denſity of air.—Lightneſs of air with moiſture, and with heat and moiſture.—The heat of ſummer and autumn.—Effect of Evaporation from ſurfaces.—Cold.—Cold and moiſture.—Eaſterly and North-Eaſterly winds.—Rain, ſnow, ſtorms.—Active exerciſe in warm air.—Diſſipation of heat.—The aſthmatic months of Auguſt and September.—Froſty weather.—The advantage of froſt.—Evacuations of blood.—Violent purging or vomiting.—Inanition.—Accelerated circulation.—Suppreſſion of evacuations.—Repulſion of exanthemata and gout.—Duſt in the air.—Metallic fumes.—Smoak of tobacco.—Smells.—Fixed air.—Paſſions of the mind.—Changes of the moon.—Errors in diet.*

THE influence of the air, may not produce any evident effects upon the habits of a nation or body of men generally, but changes of the atmoſphere, may, doubtleſs, induce alterations in the health of particular ſubjects, who may ſuffer paroxyſms, or enjoy remiſſions of diſeaſes to which they were prediſpoſed. In all diſorders of reſpiration, whether febrile or not, this truth is confirmed by experience. In *pertuſſis* it is particularly remarkable, but not more ſo than in Convulſive Aſthma. Sir J. Floyer lived in Oxford twelve years, and had little diſtreſs from his complaint; but he never viſited Staffordſhire, his native air, without a ſevere paroxyſm or two. An Aſthmatic, whoſe caſe will be related, for ſeveral years after the eſtabliſhment of his diſorder, could not ſtay a day in the place of his birth and the reſidence of his childhood, and which he had occaſionally viſited with impunity till the age of thirty, without the ſame effect, though the diſeaſe began in a different ſituation, leſs favourable to its production.

The atmoſphere may affect the Aſthmatic by ſeveral changes. When the mercury in the barometer ſtands as high as thirty inches, the denſity of the air is ſufficient, *cæteris paribus*, to preſerve the intermiſſion of his diſorder; and alterations from this ſtandard to a lower, will be unfriendly. Beſides a change from this degree of denſity, the air may be cold or warm, cold and moiſt, or warm and moiſt; and rain, ſnow, or froſt, ſtorms, and fogs, may give additional inconvenience, but ſlight in compariſon of the ſtates which occaſion their appearances.

The obſervations of Floyer on the influence of denſity, or rarity of air on the Aſthmatic, are well founded. In a denſe atmoſphere, acrid miaſmata, effluvia, and vapours are ſuſpended high, and are therefore not ſo likely to irritate the pulmonary membranes: floating particles will not ſo much offend patients ſubject to Aſthma of the preſent ſpecies, from mucous irritation, as thoſe ſubject to the other ſpecies, whoſe ſenſibility may be equal, but whoſe pulmonary membranes are more naked of the natural defence of lymph.

Vapours are, however, accuſed in all ſorts of Aſthmas, without reflection on the impunity with which many Aſthmatics inhale the atmoſphere of London and Holland, where the advantage derived from denſity and preſſure, more than balances the inconvenience of fog, and various animated filth, which, from its quantity, and inceſſant ſupplies, is always floating and being inſpired.

In higher ſituations, impurities of the air are a more ſenſible exciting cauſe of Aſthma, or it may be more accurate to ſay, that when vapours hang low in theſe ſituations, we have a certain index of the diminiſhed denſity of the air, which would otherwiſe carry them off; and that the cauſe of their low ſuſpenſion is really a ſtate of atmoſphere, producing, at the ſame time, the diſorder of reſpiration.

It may be ſaid upon the ſame principle, that a dry and ſettled atmoſphere is friendly to the Aſthmatic, not only becauſe it is free from impure vapours, but alſo as having more elaſticity to preſs upon the veſiculæ of the lungs.

The ſtate of the atmoſphere renders the combination of oxygen with the blood difficult or eaſy. The ſoft and thin membrane through which it is abſorbed, has been frequently, in its natural ſtate, ſhewn to admit of the penetration of elaſtic fluids. The prediſpoſition appears in Aſthma unfriendly to their union, and changes in the atmoſphere may more materially obſtruct it.

The uſual denſity of the air being loſt, a certain volume will in proportion have leſs weight, and preſs leſs againſt the membrane, and the ſame volume will have leſs oxygen to be attracted to the new affinity. Where the heat of the body ſo much promoting the proceſs was before diminiſhed, this ſudden rarity may be a powerful exciting cauſe of the Aſthmatic paroxyſm.

A certain quantity of oxygen is conſumed in leſs time, in the reſpiration of air which has great preſſure, than in air of little preſſure. Under the *greateſt* preſſure, which was made by an admirable chemiſt, the oxygen was conſumed in leſs than half the time of the *ſmalleſt*, although the exceſs of the former above the latter, was much leſs than that which men experience in the common changes of weather.* If we reflect upon this circumſtance, we muſt conclude, poſitively, that oxygen enters the blood veſſels, contrary to the opinion of Dr. Crawford, and that preſſure conſiderably encreaſes its penetrating force.

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* See Minutes of the Society for promoting Philoſophical Experiments and Converſation.

The objections which have been made to the accounts of Hæmorrhages having been occaſioned by great rarity of the air on high mountains, though ingeniouſly ſupported by experiments, cannot overturn the plain fact, of conſiderable diſorder of reſpiration having been repeatedly experienced from this cauſe; though it is not to be ſuppoſed that concurrent cauſes in the habits of the perſons affected, or greater proportions of unreſpirable fluid may not occaſionally operate in theſe regions. The preſſure of external air upon the human body is eſtimated at 32,000 pounds weight in ſome ſtates of its denſity, in other ſtates it is ſuppoſed to be reduced to half that weight.

The ſubject has been more accurately handled than is here neceſſary to ſpecify: the morbid alterations in the animal body, which are produced in conſequence of the changes in the weight of the air, are more the object of this inquiry.

An animal killed by exhauſtion of air under the receiver of an air pump, has the right ſide of the heart and veins greatly diſtended with blood, and the left ſide almoſt empty.

An animal of equal vigour placed under a magazine of a condenſing machine, will bear an encreaſe of denſity of three or four atmoſpheres.

The former animal expired in two minutes, the latter remained a quarter of an hour at a time, without any material inconvenience, and appeared to ſuffer moſt from returning to his cuſtomary medium of greater rarity.* In the firſt experiment the equilibrium was deſtroyed between the external air, and the air circulating with the fluids in a fixed ſtate, which therefore expanded. This ſtate the muſcles of inſpiration could not overcome, and the lungs being forced into a ſtate of expiration, the blood could not be paſſed to the left ſide of the heart, from the collapſe of the veſſels.

In the ſecond caſe, an exceſs of air merely effected a more perfect and durable expanſion of the cavities, and thus facilitated conſiderably the paſſage of the blood to the left ſide of the heart,† doubtleſs affording at the ſame time increaſe of vigour and ſtimulus to the actions of that organ.

M. de Sauſſure had proof of the inconvenience to reſpiration, from great rarity of air, on the top of Mont Blanc, the mercury in the barometer at the ſame time ſtanding at little more than half the height which it ſtood at in the plain below. Sir W. Hamilton obſerved a ſimilar difficulty of reſpiration on Mount Ætna, which he attributed to the rarity of the air, diſtinct from ſulphurous vapour. Oxygen has been found in leſs proportion, as a component of the atmoſphere in theſe high regions, than in the lower, which is an additional reaſon for diſordered reſpiration.

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* Mr. Kite on the Submerſion of Animals, p. 50, &c.

† Mr. Kite, p. 52.

If to the lightneſs of the air, *moiſture* be added, its influence may be more injurious, and has frequently been felt in various ſituations, when the prediſpoſition to Aſthma was not preſent. This conſtitution of the air excited the diſorder of reſpiration, treated of by Dr. Miller, under the name of Aſthma.

Heat and moiſture appear to influence the denſity of the air more than philoſophers had conceived, before the obſervations of M. de Sauſſure, jun. appeared.* The effect of theſe is felt by other valetudinary ſubjects of relaxed fibre, as well as the Aſthmatic, but by none more than the latter.

In *ſummer* and *autumn* the atmoſphere is rare, and ſo far hoſtile to the Aſthmatic; but to leſſen this inconvenience, he enjoys the grateful ſenſe of a warm ſkin, and general perſpiration, by which the circulation is determined to the ſurface more than in the colder months. If it were not for this diverſion in favour of the lungs, he would perceive much more of his complaint than he really does in the warm ſeaſon, for many circumſtances operate againſt him then which do not in winter. The exhalation from the pulmonary veſſels, occaſionally encreaſed by exerciſe or other cauſes, will oftener be profuſe in the hot months, and be more ſuddenly followed by the coldneſs, which is known to come upon ſurfaces, in proportion to the evaporation made from them.

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* Journal de Phyſique par M. L'Abbé Roſier, Tome xxxvi. Memoire ſur la Denſité, &c. p. 98.

Dr. Ryan* endeavours to eſtabliſh the doctrine of cold, occaſioning this diſeaſe. *Cold and Moiſture* check cutaneous perſpiration, and diminiſh the heat of the lungs; there is, therefore, additional fluid circulating to the pulmonary exhalents, and there is leſs expiration of vapour in breathing. The ſkin may even be changed from a perſpiring, to an imbibing ſtate, creating an exceſs of water in the veſſels. We have, therefore, in this ſtate of the atmoſphere, an exciting cauſe of Aſthma, as frequently as in moiſture with warmth. Cold alone will not uſually excite the paroxyſm, though there may be ſtates of the atmoſphere inducing great torpor on the pulmonary exhalents, without the poſitive preſence of aqueous vapour, or moiſture. The *Eaſt, and North-Eaſt Winds*, are ſo piercing, as to overcome the beneficial influence which coldneſs, ſimply united with denſity of air, would have on the reſpiration. Theſe penetrating winds are felt *intus et in cute*, by all perſons of lax fibre and ſenſibility of nerve; but a froſt in itſelf is friendly to the Aſthmatic.

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* Obſervat. on the Hiſtory and Cure of the Aſthma.

The eaſt and north-eaſt winds, not only chill the lungs, making their capillaries incapable of contracting on their contents, but they check cutaneous perſpiration inducing another cauſe of Aſthma by this matter being turned upon the lungs. Why the cutaneous capillaries are conſtricted preceding their torpor, or in conſequence of it, whilſt the pulmonary capillaries are affected with torpor and dilated apertures, can only be ſatisfactorily explained by recurring to the prediſpoſition of an Aſthmatic ſubject; at the ſame time allowing the fact, that even when this prediſpoſition does not exiſt, perſpiration ſuppreſſed on the ſkin, will always find an exit from the pulmonary capillaries, or thoſe of the inteſtinal canal, unleſs an acute fever ſupervene, from every paſſage being equally obſtructed. This is proved by the moiſt expectoration of a mild catarrh, and by gentle diarrhæa from taking cold. In the Aſthmatic ſubject fever does not readily come on, and the pulmonary veſſels having greater debility than thoſe of the reſt of the ſyſtem, the flux is diſcharged from them.

Changes to rain or ſnow affect the Aſthmatic, becauſe of the decreaſe of weight in the air, which gives occaſion to theſe alterations. Storms of any kind are uſually attended with ſudden rarity of atmoſphere, and according to the prevalence of exceſſive heat or cold accompanying the change, the Aſthmatic will be more or leſs affected. Sir J. Floyer obſerves, with juſtneſs, theſe effects, but attributes too great conſequence to the influence of matters floating in the air, apparently looking at phænomena as cauſes of Aſthmatic fits, which merely follow changes in the denſity of air, as effects equally with theſe.

Active Motion in a warm air, with frequent reſpirations, produces a great encreaſe of exhalation from the ſuperficial capillaries, and from the lungs. The further augmentation of heat, is by this means prevented; but this is not the only conſequence of profuſe exhalation in the Aſthmatic ſubject. The tone of his pulmonary exhalents being much reduced, a great and ſudden abſtraction of heat may leave them in too torpid a ſtate to contract upon their contents. But the general vaſcular tone, though lowered, not being reduced ſo much as the tone of theſe exhalents and the *vis a tergo* being greater from occaſional cauſes, the ſerous part of the blood paſſes through the enlarged apertures ino the veſiculæ.

The *Diſſipation of Heat*, by this means, is productive of the moſt ſevere fits of Aſthma. Floyer had moſt returns in the hot months, and they were likewiſe the longeſt. The month of Auguſt was particularly his enemy, and I have ſeen in Auguſt and September more ſerious paroxyſms than in any other; for, in this period of the warm ſeaſon, the body is relaxed from the heat having continued for ſeveral months, and the prediſpoſition to be influenced by this exciting cauſe, and by the great rarity of air, is therefore much ſtronger than in the earlier months.

But heat may be carried away from the body by other means beſides exhalation, and this effect takes place in froſty weather, but not with the ſame conſequences to the Aſthmatic. A *froſty air* is more denſe, has more weight for its bulk, and contains a greater proportion of oxygen in the quantity inſpired at every inſpiration. A perſon will alſo breathe quicker in this air, and therefore takes more frequently a change into his lungs, oftener decompoſing it, inhaling oxygen, and diſcharging carbon. The influence of cold upon the capillaries would be injurious in this caſe, if not ſpeedily counteracted by this animating remedy, for the weak contractions of the veſſels, and the chronic poverty of blood.*

Beſides the loſs of heat locally or generally inducing torpor of the veſſels, a deficiency of other ſtimuli may occaſion it. *Diſtention* excites the actions of the whole arterial ſyſtem, and therefore the paroxyſm of Aſthma may be excited by withdrawing part of this ſtimulus.

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* See Dr. Crawford Exper. and Obſerv. &c. alſo Minutes of the Society for promoting Philoſophical Experiments and Converſation, Exper. &c. concerning Reſpiration.

Profuſe Bleeding, ſpontaneous or artificial, may leave the veſſels with too little ſtimulus from their contained fluids, both on account of the want of diſtention, and the want of a pungent quality, which red globules and gluten give to the blood. The capillary veſſels will in this caſe not contract to their healthy ſtrictneſs of diameter, and the fluid being thinner, as well as weaker, will more readily eſcape.

"Animals," ſays Dr. Hales, "when they are "near expiring, do uſually breathe quick, the "lungs then labouring to heave faſt, that the "languid blood may have a freer courſe through "them, to ſupply the then almoſt bloodleſs pul-"ſations of the heart, as was the caſe in the "experiment of the mare when her blood was "near exhauſted."*

When by the great evacuation of blood, the veſſels loſt their ſtimulus, the animal fell into cold clammy ſweats, which could not happen from the protruſive force of the blood, but muſt ariſe from the relaxation of the capillary exhalents.

There is reaſon to apprehend, that an injudicious uſe of the lancet in pulmonary complaints has brought on Aſthma in ſome inſtances. I am certain of this effect in others where Dyſpeptic pain of the ſtomach was ſuppoſed to indicate pneumonic inflammation.

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* Hales' Statical Eſſays, Vol. II. p. 6.

Violent Purging or Vomiting may excite the paroxyſm, or indigeſted matter in the firſt paſſages productive of thoſe evacuations, may, at the ſame time, irritate the reſpiratory muſcles of the abdomen and thorax, into ſuch an exceſs of contractions as form the third ſpecies of the diſeaſe. But conſidering the exhauſtion and debility occaſioned by purging and vomiting, the alimentary canal is left in a condition powerfully adding to the prediſpoſition to Aſthma. This artificial depletion is not leſs productive of the fit, than faſting is.

The *Want of Food*, or neglect of regular meals, will as certainly excite the paroxyſm in ſome aſthmatics, as a moderate and light ſupper of tender animal food has alleviated the diſtreſs in others, when in ſome inſtances of long eſtabliſhed complaint, the approach of the fit was plainly indicated by the feelings of the patient.

A critical attention is therefore neceſſary to the calls of the ſtomach, and the power of that organ to perform digeſtion. The firſt ſhould never be neglected, and the latter never oppreſſed. If the ſtomach be loaded, the fit will be more violent than after the occaſional cauſe of faſting.

Faſting, is not only an exciting cauſe of Aſthma, but it will, according to its extent, encreaſe the prediſpoſition to the diſeaſe, by lowering the heat of the body. Animal heat may not ſolely be dependent on the decompoſition of the air in the lungs; or, if it be, that operation is much influenced by cauſes variouſly affecting the habit through the medium of the alimentary paſſages and otherwiſe.*

A ſudden *Encreaſe* in the *Impulſe* of the *Circulation* may excite the paroxyſm of Aſthma. It may be ſuppoſed that previous to the effuſion of ſerum, a gradual diſtention of the veſſels had taken place. Dyſpnœa would attend the courſe of this alteration in the tone of the veſſels, and encreaſe with the diſeaſe. When the veſſels are no longer dilatable, they may be ruptured, or effuſe by their capillary branches their ſerous fluid. Exciting cauſes will haſten this event, and rapid or violent bodily motion by impelling the blood ſuddenly to the lungs is one cauſe.

Upon the *Suppreſſion* of the *Hæmorrhoidal* or *Menſtrual Flux*, a ſubject diſpoſed to pulmonary accumulation of blood, or with weak and dilatable veſſels may ſuffer Dyſpnœa, or a paroxyſm of Aſthma. A reſtoration of the ſuſpended diſcharge removes the difficult reſpiration.

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* See Mr. J. Hunter on Animals producing Heat; alſo Dr. Percival's Eſſays, Vol. II. on Famine.

The ſame may be ſaid of *Repelled Eruptions* or *Gout*; but cauſes of this kind excite the periodic paroxyſm, only in perſons who have before ſuſtained it. If the breathing be affected from thoſe exciting cauſes, when Dyſpepſia and the Aſtmatic habit are not eſtabliſhed, the affection may be rather called Dyſpnœa, or if attended with fever, pneumonia or peripneumony.

The membrane of the air pipes of the lungs is defended more conſiderably from the acrid particles floating in the air, in the ſpecies of Aſthma now under our conſideration, than in the natural ſtate where this diſeaſe is abſent.

But the muſcles of reſpiration of an Aſthmatic are at all times very irritable, from the repetition of paroxyſms, and ſlight offences may therefore induce a fit.

Duſt of any kind is an exciting cauſe. Hair powder has been obſerved in many inſtances to bring on firſt ſneezing, then by aſſociation of muſcles more powers are put in action, to eject the inconvenience, which may, poſſibly, have only touched ſome points of the trachea uncovered by mucus.*

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* See Floyer's Treatiſe, p. 74, &c.

Metallic Fumes are very pungent, and will ſhew their effect on an Aſthmatic, by exciting a paroxyſm.

The *Smoak of Tobacco* is in moſt caſes offenſive to the Aſthmatic, and even when the habit of inhaling it is purſued, and abſurdly thought to be a remedy, the patient inſpires the very qualities which are conſtantly being ejected in natural reſpiration, and thus ſtrengthens the prediſpoſition to the diſeaſe. It is affirmed that ſmoakers are Aſthmatic, and Diemerbroeck found their lungs dark coloured, approaching to black, and ulcerated.*

Sir J. Floyer mentions a patient who ſmoaked to cure a pain in the ſtomach, and by this means acquired the Aſthma.

Fetid Smells are ſometimes cauſes of the fit, but not often, unleſs particles not diſſolved, but diffuſed in the air, are received into the trachea.

Strong Perfumes, generally called ſweet, are as likely to excite a paroxyſm as fetid ſmells. They all phlogiſticate the air to a ſmall degree, and though the eudiometrical experiments of M. Achard prove no conſiderable injury from the mixture of theſe fumes with common air, the ſenſible membrane of the trachea and bronchia of an Aſthmatic, is a teſt which frequently ſuperſedes all reaſoning from philoſophy.*

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* Diemerbroeck, Lib. II. p. 444.

The *Aerial Carbonic Acid* is an exciting cauſe recorded by Sir J. Floyer. I have known the inſpiring of the vapour of fermenting ſubſtances in brewing, to be followed immediately by the paroxyſm.

The *Paſſions* of the mind may excite a paroxyſm, or ſtrengthen the prediſpoſition to it.

Anger ſhews its effects on the circulation whenever it occurs. The fluids ſeparated from the blood, are determined to their excretories in greater haſte, and in larger quantity. Hence a redundancy of ſaliva, and of bile, and a ſtraitneſs in breathing, are not uncommonly the reſult of an impetuous ſally of anger. The Dyſpeptic diſpoſition is ſtill more certainly encreaſed. *Joy* encreaſes the vigour of the heart and arteries, and by impelling the circulation before circumſtances have allowed the contractile power of the exhalents of the lungs to be reſtored, their orifices may let the ſerum eſcape. *Love, Grief, Terror*, appear to diſtreſs the mind and relax the habit, they may not in this view ſo frequently excite the paroxyſm, as they may add to the prediſpoſition to it.

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* See Journal de Phyſique, Tome 26. De L'Effet des Parfums ſur L'Air.

The Aſthmatic is ill calculated for *Venereal Pleaſures*, however he may be prompted by ſenſation or taſte to purſue this indulgence. Gratification not uncommonly excites the paroxyſm.

Severe Study affects the digeſtive powers, and therefore promotes prediſpoſition. Ardent thinking, attended by the occaſional ſatisfaction of uſeful diſcovery, and the hope of reputation, may animate the body, and invigorate the mind, but theſe advantages are more than balanced by encreaſing diſorder of the firſt paſſages, from want of exerciſe ſo neceſſary to the periſtaltic action of the inteſtines.*

If the *Changes* of the *Moon* ever influence the motions in animal bodies, they may be ſuppoſed with great reaſon to excite the paroxyſm of Aſthma. It appears that the attractions of the ſun and moon at ſome periods combine their powers, and influence the gravity of bodies with greater effect.

For the moſt ingenious reaſoning on this ſubject, ſee Zoonomia, Vol. I. XXXII. 3.

Errors in Diet are a great ſource of inconvenience to the Aſthmatic, as may be expected, from conſidering the Dyſpeptic condition attending this diſorder, and often the very cauſe of it. Under this head may be ſpecified, drinking too much of ſtrong liquors, or liquors full of carbonic acid, with aceſcent materials in the compoſition, as ſweet wines and new beer. Profuſe indulgence in the uſe of tea, and warm watery liquids of all kinds; theſe are exciting cauſes of Aſthma. Heavy ſuppers, eating between meals, and generally, all food of difficult digeſtion, may produce the ſame effect; ſuch are ſmoaked meats, paſtry, fat pork or beef, water foul, raw vegetables, ſallads and unripe fruits; alſo boiled cabbage and carrots, rich ſoups, jellies, and ſauces. Theſe alimentary ſubſtances are not readily governed by the ſtomach of an Aſthmatic, but remain till a fermenting proceſs takes place, when, if purging or vomiting bring no relief, the paroxyſm may be excited; even when theſe evacuations occur, ſuch conſequence is not often prevented. Every thing which in Dyſpepſia ought to be avoided, ſhould be abſtained from by the Aſthmatic, who muſt rigidly believe that his paroxyſms may be more frequent, or the intermiſſions longer, accordingly as the ſeductions of the table are too powerful for his prudence, or are reſiſted by his care. Intoxication and ſurfeit are amongſt the worſt of his enemies, and have ſo little allurement where the habit is infirm, that an Aſthmatic is not likely to ſuffer from theſe exciting cauſes.

Diſordered Reſpiration has been acknowledged by all pathologiſts to proceed from obſtructions which we have enumerated, creating *Dyſpnœa*, or *Continued Aſthma*. *Convulſive* Aſthma has been enquired into, and been found to follow the immediate oppreſſion of extravaſated lymph in the lungs; this may be called the *Firſt Species* of the *Periodic Diſeaſe*, as it embraces a very large majority of the caſes met with in practice.

In examining the remaining ſpecies, the object of our inquiry is more obſcure. But analogy is ſtill diſtinct, and we have aſcertained ſome fundamental laws of the animal œconomy, which beſtow conſiderable light upon its relations.

SECT. XII.

Second ſpecies of Convulſive Aſthma from the irritation of aerial acrimony in the lungs.—*Diagnoſtics of this ſpecies.—The Remote Cauſes.—Condition of the mucous membrane.—The nature and effects of effluvia.—Odours.—Inſtance of a convaleſcent from the diſeaſe of Mucous Irritation. — Deduction ſupporting the propoſition in Sect.* 2.

THE *Second Species* of Convulſive Aſthma is alſo occaſioned by irritation ſeated in the lungs. Being accompanied with little or no expectoration of mucus, it has been commonly called the *Dry Aſthma*. This ſpecies invades the patient ſuddenly, and will be generally found to ſucceed an alteration of the wind, or change of ſituation. We may, therefore, conſider the cauſe to be the *Acrid or Offenſive Quality* of ſome *ſubtle matter*, conveyed by the air, and attached in the act of inſpiration to the ſenſible membrane lining the tracheal and bronchial pipes. This may be connected with the cauſes explained in the preceding ſections, but it may alſo be unconnected with *ſenſible bulk*, and yet embody the proximate cauſe of Aſthma.

All pathologiſts have been ſtopped in their courſe by this obſcure diſeaſe, which, probably, confuſed their views of Aſthma from manifeſt cauſes. Here they wanted the advantage of having ſet out with a preciſe knowledge of the external ſigns, and their object, the natural laws which govern them, and the principle of irritation which they indicated in caſes where it was really conſpicuous. This firſt ſtep would have opened a path in which analogy, and the ſame laws would afterwards have led them on.

This ſpecies makes its attack by day more frequently than by night, and is diſtinguiſhed by there being little expectoration, and ſometimes none, particularly when the complaint goes off abruptly and ſoon, for then the offence is probably removed by change of air and ſtrong expirations.

If the fit continue long, the irritation may produce an encreaſed action in the excretories of the mucous membrane of the bronchia. The moſt violent of the ſymptoms then generally ſubſide, becauſe the irritating matter becomes inveloped in mucus, unleſs the habit have arrived at that ſtate of morbid ſenſibility, in conſequence of which, convulſive motions remain, or return at intervals after the original excitement of them had been removed. Wheezing is not a ſymptom, unleſs the long continuance of the fit ſhould induce ſuch a ſecretion of mucus as may ſtraiten the air pipes. But this ſymptom is declared by many to be entirely abſent, as it was conſidered ſolely dependent on the mucus which appears in the Firſt Species, till the Spaſmodic Conſtriction was invented. Etmuller makes the diagnoſtics of the laſt ſpecies, and this, to conſiſt in the preſence or abſence of wheezing. The truth is, that wheezing does ſometimes come on from the cauſe mentioned, but it may be particularly noticed, that the exceſs of muſcular actions has firſt ſubſided. The Aqueous Diabetes is abſent, but the action of the intercoſtal and the abdominal muſcles, is the ſame as in other varieties of diſordered reſpiration. Whether a ſpaſmodic conſtriction of the bronchia take place or not, I am entirely ignorant, for reaſons before delivered.

In attributing Aſthma of this kind to irritation, I infer, from analogy, that the muſcular motions which take place, indicate an offence in ſome organ which theſe motions are to ſerve: and though the offending matter be not apparent to the ſenſes, I prefer probable concluſions in reaſoning on the few inſtances which this ſpecies offers, to deranging the induction eſtabliſhed in a great majority of caſes of Convulſive Aſthma, by aſſigning to ſimilar effects cauſes diſſimilar.

In this ſpecies the habit is more ſenſible of ſlight offence than it is in the firſt. The hydropic diatheſis is never preſent, and frequently the tone of the veſſels of the lungs is not reduced. Some turgeſcence of blood may appear in the face, and bleeding, if not poſitively uſeful, is not commonly injurious. Dyſpepſia ſometimes accompanies the attack, but not with violence. The peculiar marks of prediſpoſition to be attended to, are the morbid ſenſibility or irritability of the body, and the dryneſs of the Schneiderian membrane.

Moſt writers have obſerved that a little ſpitting may take place in the Dry Aſthma, though there be no wheezing, but the line which they have drawn takes too many caſes from the ſpecies before treated of, and enlarges the liſt of the preſent, more than experience will be able to defend.

The ſenſible membrane of the trachea is defended by its lymph from the attack of aerial acrimony, as far as the condition of the body, varying in ſenſibility to external impreſſions, will admit of this defence. Other things being equal, this guard is ſufficient, and complies with the purpoſe for which it was deſigned.

But if there be a deficient ſecretion of lymph upon this membrane, and abſorbing power be active, its ſurface may be irritated by a thouſand imperceptible points which the air conveys in the act of inſpiration.

It is ſaid, that then a perpetual dry cough, inflammation, and hoarſeneſs follow,* but theſe unequivocal ſymptoms of phthiſis do not always occur. A more ambiguous ſtate may prevail, which inclines to Aſthma, though the danger of phthiſis will always be conſiderable, if ſituation expoſe the patient to the repeated or permanent application of the irritating cauſes.

The matter of this irritation is diffuſed in the air. *Effluvia* iſſue from bodies of the denſeſt texture, and are diſcovered by the odour of all aromatic ſubſtances. Dr. Liſter found a number of ſtones which had been laid in drawers made of Barbadoes cedar, thickly covered with a liquid roſin, like Venice turpentine, though no manner of exudation appeared in any part of the cabinet. He concluded, that all the turpentine of the cedar wood had been carried into the air, and then condenſed into its fixed ſtate upon the ſtones. And that all odoriferous bodies ſpend their very ſubſtance in effluvia.†

The magnetic and electric influences depend upon ſtill more ſubtle effluvia, whoſe activity is ſufficiently known by its effects.

The aſtoniſhing diviſibility of matter admits of proof to an extent which vindicates the inference of effluvia conſiſting of ſuſpended particles.

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* Obſervat. on Phthiſis, by W. White, M.D. p. 63.

† See Philoſoph. Tranſact. No. 110. p. 224.

Mr. Boyle ſhews an inſtance of the diviſibility of one grain of copper, and proves, that this portion of matter imparted a conſpicuous colour to above 256,806 times its bulk of water; a manifeſt tincture to above 385,200, and a faint, but diſcernable colour to above 530,620 times its bulk of water.* What then may not be expected from the ſolvent qualities of the air, or from its capacity of ſerving as a medium of diviſion for the particles diffuſed in it?

The influence of odours upon different people will be varied according to an idioſyncracy which determines them to be agreeable or not. Muſk is offenſive to many, whilſt others delight in its effluvia. Mr. Boyle gives many inſtances of the effect of odours on the ſenſations of man; and when it is proved that ſuch odours are offenſive, there can be little heſitation in admitting the probability of their inducing Aſthma, if the body have the prediſpoſition before ſtated. It may alſo be readily allowed that particles not qualified to affect the ſenſations, may affect the irritability of an Aſthmatic, by offending the pulmonary function; or they may be received in a ſtate ſo very diluted, that the membranes may not ſuffer from their attack, until, by accumulation and mutual attraction, they take a more condenſed and ſubſtantial form; and by their pungency become ſuddenly offenſive in the lungs.

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* The Hon. Mr. Boyle's Works by Dr. Shaw, Vol. I. p. 409.

Influence of this kind is moſt prevalent in populous or manufacturing places. There are perſons ſo ſenſible of impreſſion as to be ſeized with a cough immediately upon their entering a town. And others ſuſtain the paroxyſm of Convulſive Aſthma, if they come out of the pure air of the country and ſleep in a town. The greater or leſs preſſure of the atmoſphere modifying, more or leſs, ſuch inconvenience.

This appears ſufficiently to ſupport the inference previouſly offered by analogy; and to prove the exiſtence of irritation as the cauſe of this ſpecies, though its form cannot be diſcerned.

The ſimpleſt caſe of reaction in the pulmonary ſyſtem is that of expiration by cough, and the reſiſtance of the trachea by ſhutting of the glottis to the entrance of further acrimony: this happens when an animal is expoſed to breathe unreſpirable air. His expirations exhauſt the lungs of good air, but nature oppoſes the repleniſhing them with bad.

Though the irritating matter be too ſubtle for obſervation, it yet may be excreted in the vapour of expiration, as it was received without immediate perception of its inconvenience in inſpiration.

Many of the exciting cauſes of the paroxyſm in the laſt ſpecies of Aſthma may be here conſidered as proximate, becauſe they induce no intervening irritation more near to the actual ſymptoms than themſelves.

When effluvia fall upon the pulmonary membrane, the irritation of the particles will, in the firſt place, be felt according to its dryneſs; and, ſecondly, in proportion as the habit is diſpoſed to the condition, commonly called nervous. If there have been frequent repetitions of irritating cauſes and convulſive efforts of the reſpiratory muſcles, the Aſthmatic paroxyſm may much more probably ſupervene, upon the milder effort to eject an acrid particle by ſneezing or cough.

When an Aſthmatic is convaleſcent from the diſeaſe of mucous irritation, he is very liable to be the ſubject of this ſpecies. The abſorbing ſyſtem is put into additional activity by the plan of cure which, it will appear, is the only ſucceſsful one in treating that ſpecies. The habit of the Aſthmatic is generally ſtrengthened, and the morbid laxity of the pulmonary exhalents is conſiderably leſs. There is, therefore, leſs danger of effuſion, and greater abſorbing action as the cure proceeds; but the *ſenſibility* of the pulmonary ſyſtem is not reduced to a healthy ſtandard, and the *force of habit* is yet to be overcome. The irritation of effluvia may therefore excite the uſual muſcular contractions ſooner, as far as regards their influence, than when the membrane was defended by the lymph.

I have had frequent experience of this fact, particularly in an Aſthmatic reſtored from the ſtate deſcribed in the preceding ſections, whoſe Schneiderian membrane became unuſually dry as the cure proceeded, and was even affected with inflammation. The fluctuating qualities of the air often irritating this membrane, occaſionally produced a paroxyſm without expectoration, until the habit of relapſe was conquered by the means purſued.

In the preceding ſections it was eſtabliſhed, that the convulſive actions in Aſthma were occaſioned by the irritation of ſome *bulky obſtruction* in the lungs, and it is now ſhewn that the ſame effect may be cauſed by the irritation of *ſubtle acrimony*, always preſent in the atmoſphere in greater or leſs degree, and ready to be inſpired.

Both ſpecies then having their cauſes of irritation ſeated in the lungs, we have ſo far ſupported the propoſition, that, "*the exceſſive* "*contraction of the muſcles of reſpiration indicate* "*an injury or offence exiſting in ſome organ which* "*theſe muſcles ſerve.*"*

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* See Sect. II. p. 14.

SECT. XIII.

Third ſpecies of Convulſive Aſthma from irritation in the Abdominal Viſcera.—*Inquiry, if the immediate cauſe may be extraneous to the thoracic cavity.—Aſſociation and ſympathy of muſcles.—The final cauſe and indication of ſympathies.—The muſcles of reſpiration are ſubſervient to the functions of ſeveral organs in the abdomen.—Their convulſive contractions indicate offence to thoſe organs.—Convulſive Aſthma is occaſioned by* Irritation in the Abdominal Viſcera.—*Inſtances of this cauſe.—General Deduction.*

WE ſhall now inquire, whether this convulſive diſorder of the reſpiratory muſcles may proceed from irritation in any other part of the body. Circumſtances defend the concluſion of theſe actions having been excited in ſome inſtances by irritation, external to the thoracic cavity; but it cannot be made to appear with certainty, that the irritation of extravaſated ſerum, or of aerial acrimony, was not preſent in the lungs at the ſame time. The former might be removed by the unobſerved power of abſorption; and the latter might be carried off imperceptibly in the vapour of expiration.

This conſideration will make a practitioner doubt the ſeat of the diſeaſe in many caſes, and ultimately, as has hitherto been the cuſtom, refer it to the lungs. I however, believe, that it frequently exiſts in ſome of the viſcera below the diaphragm; and I attribute the inattention to this ſeat of the cauſe, to the partial view which phyſicians have taken of Aſthma, through the medium of prejudice. If the obſerver had ſimply noticed the external actions, and conſidered them only, he muſt have been led to the inference, that they indicate an injurious offence in the abdominal, as well as in the thoracic viſcera.

We muſt acknowledge a law of the animal œconomy which has been before appealed to.* A Sympathetic Aſſociation of muſcular contractions is known to take place, when the fibre of one muſcle is irritated. In this manner teneſmus brings on ſtrong periſtaltic action of the whole inteſtinal canal. This affection of the rectum is alſo excited when the upper part of the canal has been irritated; it proceeds alſo, as well as ſtrangury, from inflammation of the uterus. A ſtrangury and teneſmus mutually occaſion each other. Theſe are ſympathetic affections of parts nearly contiguous, but aſſociation of actions is ſtill more extenſive.

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* See Sect. I.

An irritation of the neck of the bladder, or extremity of the rectum was obſerved by Dr. Whytt, to be the cauſe of a conſtant contraction of the diaphragm and abdominal muſcles* When the uterus is irritated by inflammation or pregnancy, the firſt paſſages are much diſordered, and vomiting is frequently excited. In labour, the moſt violent contractions of the abdominal muſcles and diaphragm take place; in other words, the muſcles ſubſervient to reſpiration are excited to act with energy, and powerfully aſſiſt in delivering the organ from its burden.

But though the actions of different muſcles may be aſſociated for a good end, we have yet in Aſthma no facts which ſhew a ſympathy or aſſociation more extenſive than may belong to the thorax and abdomen.

In reaſoning upon ſympathies, Dr. Whytt oppoſes the opinion, that they are occaſioned by anaſtomoſis of nervous branches, and gives examples of more conſiſtent affections, which, on this theory, might be expected to take place, but which do not uſually appear. It may be aſked, if the difficulty be removed by referring all ſuch inſtances to the common ſenſory, without tracing the deſign of the ſeveral motions? Doubtleſs, whatever be the origin of extraordinary ſympathies, the *final cauſe* is the good of the animal œconomy.

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* See Whytt on the Vital and Involuntary Motions. Alſo his Obſervations on Nervous Diſeaſes, p. 26, &c.

Dr. Whytt diſcovers, in the ſympathies which he enumerates, ſome that are marked with a *Wiſe Intention*. He inſtances the contractions of the abdominal muſcles and diaphragm in teneſmus, ſtrangury and labour; in ſneezing, coughing, and the hiccup; and the "increaſed motion of the "organs of reſpiration in the fit of an Aſthma, "they are," ſays he, "the efforts of nature, to "free the body of *ſomething hurtful*."*

The "*Wiſe Intention*" of all the ſympathies may ſome time be elucidated. Thoſe muſcles which ſerve the function of reſpiration, are never excited to extraordinary contractions, without affording to the conſiderate obſerver the indication of ſomething which is now offending, or which has offended, an organ in the thorax or abdomen, which it was the natural buſineſs of an individual muſcle, or the ſet with which it aſſociates, to diſcharge.

From the beſt experiments, it appears, that *Senſation* and *Irritation* are diſtinct properties of the living animal. It has been proved, very ſatisfactorily, that certain inſtinctive actions, calculated to avert injury or pain, may be independent of nervous influence, and they are therefore exerted without the intervention of the ſenſorium commune.*

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* Sympathy of the Nerves, p. 72.

But though this diſtinction, pointed out by Gliſſon, enforced by Haller, and acceded to ſince by the beſt authorities in phyſiology be juſt, it does not follow that the influence of ſenſation may not be communicated from the nerves, in which it is inherent, to the muſcular fibres, though the latter may contract without ſuch a medium of ſtimulus.

If inſtinctive actions be therefore performed by the muſcles, without nervous excitement, they are alſo performed in conſequence of it, and their contractions take place without the poſſibility of diſtinguiſhing where the ſtimulus was firſt applied, on the muſcular fibre, or on the nervous filament; but in addition to this general preſumption, it is proved, that the contraction of a muſcle may be excited by irritating the nerve leading to it, whilſt the nerve itſelf is unaffected.

We have thus obtained a certainty of the influence of the nerves on the muſcular fibre, and it is of little importance to know if this influence be mutual; every purpoſe of practice is anſwered by the aſſent to this poſition, that the *ſentient extremities* of the nerves, and the *moving*, or *muſcular fibres*, have a correſpondence ſo ſtrict, as to induce the opinion of ſome phyſiologiſts, that they are extenſions of the ſame nervous medulla.* The ſentient nerve may excite contractions, and correſpond by ſympathy, with diſtant parts. The muſcular fibre is ſuſceptible of the excitement of the *vis nervoſa*, and it is alſo irritable by ſtimulus in conſequence of the *vis inſita*.

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* Vide Croonian Lecture on Muſcular Motion, by Dr. Blane, p. 36, &c.

The experiments of Profeſſor Monro,† and his objections to the independence of the vis inſita, appear to leave the queſtion exactly on that footing, and no otherwiſe invalidate the concluſions of Haller, deduced from the irritability of the heart, after a perfect ſeparation from the body.

Salutary actions are commonly excited without conſciouſneſs but of the general effect to be produced; ſuch are ſneezing, coughing, and laborious reſpiration, belonging to the pulmonary organ. Vomiting, and diſcharging feces, which are actions of the alimentary canal and bladder; in all theſe motions, though unconſciouſly excited, the muſcles of the cheſt and abdomen are active inſtruments.

Mr. Hunter‡ noticing the analogy between coughing and vomiting, obſerved, that, in the former the lungs are paſſive; in the latter, the ſtomach is not neceſſarily active, as the diaphragm and abdominal muſcles are able to empty the ſtomach as well as the rectum.* Though this be not preciſely the fact, yet the muſcles of reſpiration are the moſt active inſtruments in emptying the lungs, and aſſiſt in evacuating the lower viſcera. This natural alliance is frequently exerted when it would not be neceſſary to produce the effect deſired. In violent coughing to diſcharge extraneous matter from the lungs, the ſtomach is compreſſed, and the diaphragm coming into action, vomiting is brought on. On the contrary, acrimony in the ſtomach and duodenum excites the aſſociated efforts of all the reſpiratory muſcles which act by ſympathy, as if the cauſe of offence peculiarly diſturbed the lungs.†

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* Vide Dr. Cullen, Inſtitutions of Medicine; alſo Boerhaave, Inſtit. p. 395.

† Obſervat. on the Nervous Syſtem, Chap. xxvii. alſo Dr. Smith's Tentamen Inaugurale, p. 45.

‡ Vide Obſervations on Digeſtion, p. 200.

The author of Zoonomia looks beyond theſe natural aſſociations of muſcular motions, and is deſirous of finding more remote connections of cauſe and effect than I apprehend can be ſupported by experience in this diſeaſe.

The object of diſcriminating the parts in which the cauſe of Aſthma may be ſeated, is next in importance to that of knowing the cauſe itſelf. It is therefore more neceſſary to conſider an opinion on this ſubject, and, in proportion to the authority of the writer, it intereſts our inquiry into the cauſe of Convulſive Aſthma; in doing this, I ſhall appeal only to the facts which he adduces. After many difficulties in arranging the theory of Aſthma, he concludes, that the Convulſive Aſthma is like other convulſions, or epilepſies, "and may be occaſioned by pain in almoſt any "remote part of the ſyſtem."

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* This was alſo the opinion of the French Phyſicians, but it has been confuted by the Experiments of Mr. Haighton. See Mem. Med. Soc. Vol. II.

† Vide Willis de Morbis Convulſivus, Vol. I. Chap. xii.

He is more confirmed in his opinion from knowing an inſtance of one lady, whoſe Aſthma ceaſed, on her being afflicted with pain, and gouty ſwellings of her large joints. A young man was alſo ſeized with Aſthma from the retroceſſion of eruptions on his face.

The laborious reſpiration of infants in teething is alſo ſtated to be the Aſthma Convulſivum exerted to relieve pain.

In adults, the author gives no example of the ſuppoſed pain being ſeated farther from the lungs than the liver, or biliary ducts. And relief by pain being transferred from the trunk of the body to the limbs, with a ceſſation of Aſthma in conſequence, muſt be admitted as evidence of the diſeaſe having been occaſioned by a cauſe ſeated in the trunk, if the fact be appealed to.

The teething of infants may produce quick reſpiration, but has the obſerving phyſician remarked, that it was then unaccompanied by fever, or diſorder of the firſt paſſages? Pyrexia diſtinguiſhes it from the Convulſive Aſthma of adults; and an affection of the ſtomach and bowels, almoſt conſtantly attending dentition, permits the inference, that ſpaſmodic reſpiration may be intended to remove that uneaſineſs.*

Has any practitioner obſerved Convulſive Aſthma to be excited, as *Tetanus* is, by a prick of the toe? It is natural to believe that where the lungs have ſhewn no indiſpoſition, and where little or no mucus has been excreted in the progreſs of the complaint, an inconvenience may have exiſted in other viſcera whoſe functions are ſerved by the muſcles thrown into ſuch violent action. The intercoſtals, the diaphragm, and the abdominal muſcles are the common property of all the middle and lower viſcera, and diſcover their uſes when fæces of the blood are expelled from the lungs in mucus, or in carbonic acid and vapour; when acrimony is expelled from the ſtomach by vomit; when excrement is diſcharged from the bowels and bladder, or a ſtone from the kidneys, ureters or bladder; and when any extraneous matter is expelled from the uterus. In theſe caſes the muſcles we have mentioned may naturally aſſociate their motions, and the indications are not obſcure; until there be good evidence of a more remote ſeat of the immediate cauſe of Aſthma; it is unphiloſophical and uſeleſs to deſert theſe limits.*

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* See Zoonomia, Vol. II. III. I. I. 10.

In the firſt part of this Inquiry there are inſtances of diſordered reſpiration from cauſes ſituated in the abdominal viſcera; and though the form of diſeaſe which they aſſume be generally that of Continued Aſthma or Dyſpnœa, periodical exacerbations may be obſerved, which are the *motus medicati* encreaſed with unavailing effort to remove the offence.

When theſe permanent cauſes do not exiſt, the paroxyſm may take its regular form from immediate irritation in parts below the diaphragm, eſpecially the hollow muſcles.

The relief which is ſometimes obtained by vomiting or purging, ſhews, that acrimony in the *ſtomach or bowels* may be a cauſe of the Convulſive Aſthma; But the example is not to be confided in where the paroxyſm does not totally ſubſide in conſequence. If the convulſive reſpiration clearly goes off, we have proof, that in theſe inſtances, no other acrimony or offence excited the actions than what was ſeated in theſe paſſages. If, on the contrary, the paroxyſm do not entirely ſubſide, we muſt remain in doubt; or, by a prudent compariſon of ſymptoms, decide, whether the remaining motions are the actions of *habit*, or ariſe from irritation in ſome other organ. The neceſſity of ſuch deliberation too often occurs in practice, and unexpected relief may be given by antiſpaſmodics, or patience muſt be ſtill exerciſed in waiting for expectoration, or ſome other diſcharge.

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* A very curious caſe of Convulſive Cough is recorded by Dr. Whytt, ariſing, ſeemingly, from conſent with the ſenſations of the lower extremities, but the reſpiration in Aſthma is performed by a complicated aſſociation of muſcles, of which a cauſe ſimilar to that of the Convulſive Cough is not yet known.

The Diabetes of Aſthmatics deſerves to be conſidered with particular reference to the diſeaſed ſtate of the ſtomach. Dr. Ferriar* remarked, that in the caſes of Chronic Diabetes which he had ſeen Dyſpepſia always preceded, and Sydenham† had regarded it, as dependent upon, that diſorder. When the ſtomach is diſtended with gluttony, or even in common inſtances with flatulence from its weakneſs, it compreſſes the veſſels, bringing back blood from the lower viſcera to the heart; the emulgents then find a difficulty in forwarding their contents by the correſponding veins, and relieve themſelves by paſſing their ſerum into the kidneys. The oftener this neceſſity occurs, the readier will be the exit, and more reſorted to by the œconomy as a mode of relief.

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* Med. Hiſt. and Reflect. Vol. II. p. 53. † Epiſtola Reſpon. l. p. 271.

Irritations of different organs frequently occur together, but the *ſtomach and duodenum* are their principal ſeats. Floyer gives hiſtories confirming this fact, but he does not make uſe of the principles which are here taken from nature; and no writer has beſore directly applied the muſcular motions of Aſthma to the purpoſe which is now pointed out. We have ſuggeſtions and hints which do not perfectly reach the object, though it appears in great ſimplicity. Inſtances of diſorder in the firſt paſſages, or biliary ducts of Aſthmatics, have been alſo remarked by many phyſicians; and I have no doubt of attention to the ſubject producing unlooked for additional evidence. Dr. Ferriar* gives the caſe of a lady whoſe paroxyſm terminated with ſickneſs and vomiting. Millar gives theſe evacuations, or the diſcharge of wind, as the critical relief in the diſeaſe which he deſcribes.

Willis ſpeaks of Aſthma from ſympathy ariſing from a ſtone in the gall bladder.

Hoffman has caſes of the ſame kind.†

I have met with ſeveral in which diſorder of the ſtomach was only indicated. A lady was affected with orthopnœa and great diſtreſs every night; ſhe had a ſtrong acidity and great inflation of the ſtomach. The reſpiratory motions were truly aſthmatic, but they diſappeared upon a return of healthy digeſtion, which took place when a ſecret cauſe of uneaſineſs was removed: ſhe had, however, frequently diſcharged from her ſtomach, acid or bilious matters with relief.

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* Med. Hiſt. &c. Vol. II.

† De Aſthmate Convulſivo, Obſ. 2. 4.

The *Hyſteric Aſthma* is, probably, generated from the ſame ſtate of the firſt paſſages in many inſtances; and, if attended with wheezing, this ſymptom is readily explained by the great diſtention of the œſophagus and conſequent preſſure of the trachea.

An Aſthmatic at ſixteen years of age parted with a conſiderable quantity of aſcarides and ſome round worms, and had no fit for two years afterwards.

A ſtone found in the *kidney* of an Aſthmatic, recorded by Ruyſch, probably added to the irritation exciting the diſeaſe.

The *uterus* may be the ſeat of irritation, which, I have no doubt, frequently occaſions Aſthma. Females, of conſtitutions peculiarly irritable, and ſtill more if they have ſuſtained dyſpnœa, may readily fall into the paroxyſm at the period of menſtruation, when the uterus is turgid with blood, creating a perception of ſomething to be diſcharged. In ſuch an inſtance, can any effort be more natural than that of the very muſcles which are ſo often employed in diſcharging ſubſtances from the uterus?

The hyſteric lady in Floyer began to ſuffer Aſthma at the age of fourteen. Diſtreſs of mind is deſcribed as a remote cauſe. Dyſpepſia followed, which, united with a particular condition of the uterus, might immediately produce a paroxyſm.

Dr. Wainwright knew a lady who had a fit every time her menſes flowed, and was worſe for all medicines for ſeven years, but afterwards had relief.*

If the irritation in the uterus be permanent, and continually inciting muſcular reaction without relief, convulſions more violent than in Aſthma, and more extenſive, may ſupervene. A young perſon, ill of the Aſthma, was unexpectedly attacked with epilepſy. The fits of this diſeaſe returned frequently in the day, and almoſt every day for ſeveral months, and no cauſe could be diſcovered ſufficient to produce theſe effects. "At "laſt, excruciating pain in making water over-"came the particular falſe delicacy, and obliged "her to diſcloſe their ſource, which was an acrid "diſcharge, excoriating the vagina, proceeding "from a diſeaſed uterus."†

The communications of nerves may be mentioned, as very probably connecting many of the motions excited by irritation in theſe viſcera; but I am ſatisfied with the cloſe analogies of facts, without launching farther into conjecture than experience and obſervation may juſtify.

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* Mechanical Account of the Non-naturals, &c. p. 14.

† Conſiderations, &c. by Dr. Beddoes and Mr. Watt. Part IV. and V. p. 89.

It has appeared in the preceding ſections, that Convulſive Aſthma is cauſed by irritation of ſome material in the lungs.

We may conclude from the facts before us, that it may alſo be cauſed by *irritation in ſome of the abdominal viſcera, but particularly in the ſtomach.*

Some caſes, with additional remarks on this ſpecies, to prove the importance of the Inquiry, will be offered in the Appendix.

SECT. XIV.

Fourth Species of Convulſive Aſthma.—*The Conſequences of Convulſive Motions.* — *Convulſive Aſthma remaining after the Irritation is removed.—The influence of habit.—Repetition of morbid motions, ariſing from ſenſation and perceptions of the mind.* — *Fever counteracts the principle of habit.—Inſtances of mental impreſſion operating upon the body, and inducing morbid motions.—Ideas of relation.—The Hyſteric Aſthma.* — *Inference from the whole.*

WHATEVER may be the origin of a convulſive diſorder, a certain conſequence of repeated attacks will be an encreaſed mobility or ſenſibility of the muſcles. Aſthma is particularly attended by this inconvenience, as appears by the paroxyſm returning after the material which occaſioned it, had been removed.

It may therefore be ſaid to exiſt without any apparent, or even probable cauſe. This ſurpriſing circumſtance is the conſequence of principles by which the animal œconomy is always regulated, and which may be referred to *habit* and *perceptions* of the mind exciting, by the medium of *ſenſation*, motions of the body when under the influence of habit.

The original motions were cauſed by *irritation* only, or that inſtinctive feeling of injury which is immediately followed by the reaction of the muſcles. *Senſation* has been ſtated to be a diſtinct property of the living fibre; but it is capable of attending, or being introduced by previous irritation. *Habit* conſiſts in the facility with which a muſcle repeats its former motions, and with which it acts in aſſociation with other muſcles. It may be called the prediſpoſition to this ſpecies of Aſthma, of which *ſenſation* may be conſidered as the proximate cauſe.

Every ſenſation of the body raiſes a perception or idea of the mind, which being recalled by the memory or imagination, brings back the ſenſation combined with it: if a complex idea be recalled, complicated ſenſations may be revived.

Thus the irritating cauſe of Aſthma makes a ſenſation of the body, creating a perception or idea of the mind, which may be aſſociated with other ideas. If any one of theſe be recalled by memory, others may be reſtored, and with ſome of them the correſponding ſenſations of the body, or irritated organ; and thus, the very emotions of mind, or the muſcular contractions of the body, which ſuch ſenſations had before occaſioned, may return.

In this view the repetition of muſcular convulſions is not always obſcure in its principles as it has proximate and remote cauſes, though not material, and may readily take place, if pyrexia do not prevent it. In caſes of thoſe poiſons which produce fever, an inſenſibility of their future ſtimulus is commonly conferred with the diſeaſe,* but in caſes of irritation not producing fever by its ſpecific quality, as in Aſthma, the ſyſtem will be more liable to convulſive actions, the oftener they have been performed; and this from the influence of ſenſation, as well as very inferior, and ſeemingly inadequate cauſes of irritation.

When *Phthiſis* has ſupervened upon Aſthma, the hectic fever deſtroys the force of habit, and the periodic paroxyſm is not preſerved, but ſubſides into moderate dyſpnœa.

In conformity to theſe principles, pneumonic inflammation may have left ſuch a debility of the capillaries of the lungs, as to cauſe an effuſion of ſerum into the veſicles: this ſtate may have continued but a ſhort time, and the convulſions of Aſthma may have taken place for a few hours only, yet ideas may have been excited by the ſenſations of this paroxyſm, and even by the circumſtances accidentally connected with it, which, recurring at intervals, may reſtore ſuch ſenſations, and by theſe the convulſive motions at firſt united with them. Paroxyſms, from ſuch cauſes, have occurred in many convaleſcent ſubjects, when the primary cauſe, after a considerata ~~conſiderable~~ balance of all the circumſtances, was not ſuſpected to exiſt.

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* As in Small Pox and Meaſles.

Operations of the animal œconomy from ordinary cauſes of greater ſimplicity, will explain the ſubject more clearly.

In the diſcharge of urine and alvine fœces, certain ideas become linked by ſenſation to the animal motions excited by the diſtention of the hollow muſcles of the bladder and inteſtines. A propenſity to theſe evacuations may afterwards return at periods, when the ideas of time or place introduce the connected ſenſations of thoſe diſcharges; and the abdominal muſcles, and diaphragm and bladder, are excited to contract though the ſtimulus of diſtention be, in fact, not preſent; but by habit, the periſtaltic motions are brought to obey the new rule of the œconomy; and urine is even ſecreted againſt the arrival of the period.

The effect of frequent emetics is well known: the ſtomach is rendered more irritable by the repetition; and ideas connected with the nauſea created by the medicine, very frequently induce the nauſea without its aſſiſtance. The ſight of a phial, or of a liquid, with which the operation had been promoted, by raiſing aſſociated ideas, led to the very impreſſion of the firſt link, and excited the contractions of muſcles which empty the ſtomach, and ſtill further, the aſſociated contractions of other muſcles, which, by the uſages of the animal œconomy, had before acted with them for other purpoſes.

The ſtrong influence of ideas which circumſtances may connect with a particular impreſſion, is too well aſcertained to be doubted. The ſenſation of terror has induced ſyncope, epilepſy, and hyſteria. The object which excited that ſenſation, may not only renew the bodily diſorder by its own re-appearance, but circumſtances may raiſe their aſſociated ideas, and theſe a train of ſenſations, the individual parts of which ſucceſſively introduce each other. When this aſſociation is eſtabliſhed, the ſame animal motions may return from apparently diſſimilar cauſes, but theſe are remote cauſes of the immediate ſenſation cauſing the diſeaſe.

A lady had been thrown into terror by a footpad, and for the firſt time ſuſtained a ſeries of hyſteric fits. Her conſtitution became feeble and acutely ſenſible. The diſeaſe returned on ſmaller alarms for many years afterwards, but particularly from ſlight circumſtances which referred to the attack, though entirely diſtinct from it. After the interval of three years, during which ſhe had diverſified her impreſſions in a diſtant neighbourhood, ſhe paſſed in a carriage along the road; and by the ſpot where the aſſault was made; and affected by the chain of ideas, and her attention to them, ſhe relapſed into ſtrong convulſions.

A female had been long ſubject to dyſpeptic complaints and irregular ſecretions of bile. She married at twenty-five years of age, and then found it neceſſary to employ herſelf in buſineſs, and attend with great care to an encreaſing family. Theſe attentions gave her the moſt trouble on Sundays; and on this day ſhe gradually became more indiſpoſed with Hemicrania; but, on the other ſix days, had her uſual health. In ten years it was much aggravated, and affected her earlier by a few hours, but did not ceaſe ſooner than before. In this form the intermittent diſeaſe continued for ſeveral years, evidently excited by the great anxiety and fatigue of one day in the week.

Her ſituation was again altered: Sunday became a day of reſt, and improvement of circumſtances diminiſhed general anxiety. It might be ſuppoſed, that the Hemicrania would be loſt with the impreſſions which brought it on, but it ſtill returns at its former periods, being linked with ideas of relation that ariſe from external circumſtances. It is probable, that a complete change of reſidence, and loſing the impreſſions created by Sunday, or placing them in another day, might vanquiſh the force of habit, and the diſeaſe.

The caſe of Hyſteric Aſthma in Floyer,* was probably firſt cauſed by a diſorder of the ſtomach. It appears that affliction, at the critical age of fourteen, had thrown the lady into hyſteria. Dyſpepſia accompanied her agitation of mind, and the acrimony of the firſt paſſages which naturally follows the diſturbance of digeſtion, might irritate the ſyſtem of muſcles into a paroxyſm of Aſthma.

The ſame contractions of the muſcles would be ſubject to recur, when the habit of their aſſociations had been once eſtabliſhed. Slight cauſes of irritation would draw on the convulſive efforts, which, though fruitleſs, would be conſiſtent with the laws of animal life. The ideas, which in the in the firſt attack of hyſteria, had met with a particular condition of the uterus at the age of fourteen, and combined at that period to bring on the affection of the ſtomach, œſophagus, and reſpiratory muſcles, being occaſionally recalled, would revive motions more readily from habit and repetition.

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* Floyer, p. 17.

Thus are many cauſes apparently loſt, though their effects be continued in the diſeaſes which they produced; habit rendering the body more liable to a recurrence of motions, accordingly as the ideas annexed to them, by circumſtances, lead to the ſenſation which is their immediate cauſe. The revolutions of ſeaſons, the changes of day and night, the hours of reſt and activity, the hours of meals, the objects of pleaſure or pain, the connections of friendſhip, or buſineſs, become united with the motions of the mind and body; and thus aſſociated, morbid actions are revived, according to their ſituation in the general chain.

All this is well known; but, like many other parts of knowledge, the reſult of common obſervation, the impreſſion has been ſuperficial, and too much neglected in practice.

But all phyſicians have acknowledged the ſtrength of indications afforded by habit in the diſeaſe of chin-cough. Here every part of the uſual plan of life and diet, is directed to be changed. A new air is particularly requiſite, without attention to the ſtandard of its purity; and by thus counteracting the former perceptions, the diſeaſe will frequently vaniſh without the continuance of medicine.

In epilepſy, a diſeaſe obſerving periods, like Aſthma, Hippocrates directs a total change in the manner of life, that former habits may loſe their influence.

In Aſthma, if in any diſorder a ſimilar alteration ought to be enforced; and, as will appear in the practice, the judgement of the Phyſician will be defended by the event.

We have now taken a view of Aſthma under all the forms in which it has been ſaid to appear. We ſhall obtain a more diſtinct direction to a cure of the diſorder, if a new arrangement of ſpecies be ſet out on the baſis of inferences from this Inquiry.

DISORDERED RESPIRATION, unattended by Fever, may be divided into ASTHMA, *Continued* and *Periodic.*

Continued Aſthma can not be properly ſaid to be free from Convulſive Contractions of the reſpiratory muſcles, but theſe are carried on without regular paroxyſms. They are more permanent, but leſs violent, and depend upon fixed irritation, Abdominal or Thoracic.

Periodic Aſthma, diſcovered in regular paroxyſms of convulſive contractions, and therefore uſually called *Convulſive Aſthma*, which term we adopt as deſcribing its character, and ſtill complying with general cuſtom.

CONVULSIVE ASTHMA:

1ſt Species, from Irritation of Effuſed Serum in the Lungs.

2nd Species, from Irritation of Aerial Acrimony in the Lungs.

3rd Species, from Irritation in the Stomach, or ſome of the Abdominal Viſcera.

4th Species, dependent upon *Habit*, and cauſed by *Senſation*, after Irritation has been removed from the Thoracic, or Abdominal Viſcera.

Theſe are the Species to which I ſhall refer, in the Second Part of this Practical Inquiry.

THE

PRACTICE IN ASTHMA.

PART II.

SECT. XV.

The Cure of Convulſive Aſthma attempted.—Indications ariſing from the diſtinctions of ſpecies.—The Paroxyſm, including exacerbations.—In what the cure of Aſthma conſiſts.—Remedies tried.—Cathartics.—Emetics.—Diaphoretics.—Bleedings.—Diuretics.—Iſſues.—Antiſpaſmodics.—Expectorants.—Bliſters.—Inhaling of Vapours.—Oxygen.—Hydrogen.—Stomachics.—Abſorbents.—Stimulants.—Bathing.—Tonics.

AFTER a full conſideration of the facts in the preceding ſections, and the inductions from them, it will not be expected, that, in attempting the cure of Aſthma, I ſhall confine myſelf to the lines which have been marked out by former writers, who did not ſufficiently attend to nature, and whoſe grounds of reaſoning and practice were hypothetical.

A Profeſſor, who directed the opinions which ſtill influence the practice of medicine, and whoſe authority concentrates the theories, real or ſuppoſed, of former teachers, gives no encouragement to the pupil, nor confidence to the practitioner in following the indications of cure aſſigned in his cauſe of Convulſive Aſthma.

" As it is ſeldom," ſays Dr. Cullen, " that an " Aſthma has been entirely cured, I therefore " cannot propoſe any method of cure which " experience has approved as generally ſucceſs- " ful." He, however, ſtates the diſeaſe " to " admit of alleviation in ſeveral reſpects from the " uſe of remedies, and he makes it his buſineſs " to offer ſome remarks upon the choice and uſe " of the remedies which have been commonly " employed in caſes of Aſthma."*

I am obliged here to diſſent from this practical obſervation, as experience convinces me that there is leſs opportunity of even only alleviating an exiſting paroxyſm of this diſeaſe, than there is of preventing its return, in which the cure may be ſaid to conſiſt. Cullen particularly followed the authority of Floyer in his doctrine on Aſthma, but did the ſucceſs of this phyſician in treating his own complaint induce the Profeſſor to adopt his theories? Floyer laboured under Aſthma for thirty years, and we cannot therefore much confide in the judgment of his practice.

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* Cullen's Practice, MCCCLXXXVII.

It is time that other indications ſhould be followed than thoſe of relieving ſpaſmodic conſtrictions of the bronchia and turgeſcences of the blood veſſels, or let us rather become empirics, and take the chance of benefit from experiment, and the happy ſucceſs of blunder, than rely on directions which confeſſedly do not point to the object of our wiſhes, and may poſſibly lead us to error.

The author of this Inquiry had very particular motives for his attention to Aſthma. Having been ſubject to its attacks, he had a proſpect of complaining of its tyranny as long as Sir J. Floyer did, if he had not at length determined to conſider the diſeaſe as if it had never before been treated, and reſorted to a practice which was not preſcribed by former rules. His attempts yielded preſent inſtruction, and gave a baſis for improvement, as the *Juvantia* and *Lædentia* more clearly elucidated the indications. He was, however, in this courſe of trials, too often the victim of eſtabliſhed, though ill-founded theories, to give them credit. Deſpair at length gave place to hope, and he can finally affirm, that the doctrines of the preceding ſections were arranged from experience in the effect of remedies, as well as from indications afforded by the ſymptoms, and a careful compariſon of analogies.

He had obſerved the ſerous effuſion in the veſiculæ of an Aſthmatic in the year 1786, but he was not led to a concluſion of the diſeaſe being generally occaſioned by irritation of that kind, till perſonal inconvenience from the diſorder induced him to examine its forms under all circumſtances and every influence. Impreſſed by the ſalutary caution of Celſus, not to miſtake effects for cauſes, he had not ſufficiently reflected on the degrees in which effuſion might take place, but conſidered the appearance in this caſe as evidence only of the termination of a violent diſorder, or the immediate occaſion of death.

At length a further conſideration of this diſſection prompted him to act more deciſively againſt the prediſpoſition. He next extended his inference from the appearance, and conſulting analogy and the laws of animal life, he took the convulſive contractions for indications of this irritating offence, which he found might exiſt in greater or leſs quantities, according to the extent and prevalence of remote cauſes.

His ſatisfaction was ſtill more perfect, when he laſtly found that the ſame *principle* of irritation might occaſion the diſorder in ſpecies of Aſthma where mucus did not appear, at the ſame time practice continuing to anſwer with great ſucceſs to the indications which he had conſulted.

The doctrines of the preceding ſections may thereefore claim the ſupport of experience; and there is the leſs occaſion for being diffuſe in the remaining part. I muſt then requeſt the reader to conſider the inferences and ſpecies propoſed in the former ſections as marks to guide his medical walk, which have not been ſet up without mature attention to the force of remedies which they point out in Aſthma.

A *Paroxyſm* of Convulſive Aſthma, is that ſtate of the diſeaſe which has an *Exacerbation* at night as long as it laſts. When the intermiſſion takes place, Aſthma is not cured; and though the paroxym be generally attended by at leaſt *Three Exacerbations*, it ſometimes is extended through many more, nor is there any certain limit to their number. If it has not embraced ſo many as three, benefit may be ſaid to have been derived from ſome operation of art or nature, when the patient has a confirmed prediſpoſition to the diſorder, but it cannot be ſaid with propriety that an advantage has been gained, if the exacerbations have been ~~be~~ renewed as often as was cuſtomary in former fits, or oftener than three times, if the diſeaſe ~~be~~ was new. Much leſs can a cure be aſſerted till an entire change in the habit of the patient, comprehending vigorous digeſtion, and eaſy reſpiration, be well eſtabliſhed after the paroxyſm has been long overcome.

The cure of the Convulſive Aſthma can therefore be only attempted with a proſpect of ſucceſs during the intervals of the fits. But the paroxyſm may be frequently alleviated; and whoever has experienced its agony, will allow the value of the ſmalleſt improvement in treating it.

I ſhall notice different remedies propoſed or tried in Aſthma, pointing out the treatment which may moſt generally be adopted to relieve or ſhorten the paroxyſm; and afterwards recommend, from experience, a plan of *Cure*, illuſtrated by a few examples, aſſigned to the ſeveral ſpecies of the diſeaſe.

CATHARTICS, conſidered generally, are injurious in caſes of Convulſive Aſthma, from irritation in the lungs. If this claſs of medicines be ever uſeful, it muſt be in that ſpecies in which the irritation is ſeated in the firſt paſſages, but even here, the practitioner muſt not forget the prediſpoſition to every form of this diſeaſe, in which laxity of fibre, or morbid ſenſibility is predominant. There may be complicated caſes in which the propriety of purging may be leſs doubtful; but there are inſtances of its bringing on a paroxyſm, and we can therefore, not recommend any evacuation but the mildeſt, with the intent of diſcharging the corrupted remains of indigeſted matters from the firſt paſſages.

Purging has been ſuggeſted as a means of promoting abſorption: if ever it can be employed in this intention, without inducing greater inconvenience than it will remove, it muſt be in Dyſpnœa, when the veſſels are turgid, but have not yet relieved themſelves by ſerous effuſion: this ſtate comes neareſt to the ſecond ſpecies of Convulſive Aſthma, but in this I have not ſeen purging of any advantage.

A bolus, compoſed of Calomel, Antimon. Tartariſat. and Pulv. Jalapii was taken when the ſymptoms of a paroxyſm had made their attack. And a ſimilar medicine was taken in another paroxyſm in the height of an exacerbation, by the author, who was affected with Convulſive Aſthma of the Firſt Species. The paroxyſm was not ſuſpended or alleviated in either inſtance, but it was certainly prolonged in the laſt.

Emetics.—Some relief has been immediately obtained by vomiting, and this happens generally in caſes of Aſthma, wherever the irritation may exiſt. But it is particularly uſeful when the firſt paſſages are loaded with indigeſted matter, ſo frequently exciting the paroxyſm in the firſt ſpecies, or acting as the proximate cauſe of it in the third.

Nauſeating doſes are moſt uſeful in the three firſt ſpecies, as they determine the fluids to the ſurface of the body, and thus relieve the lungs or abdominal viſcera; they alſo promote abſorption of extravaſated ſerum, and exhalation from the lungs, and are powerful expectorants.

Etmuller and Baglivi recommend vomits, and Floyer approves of their operation once a month; but a repetition at regular periods is to be condemned, as it may probably tend to introduce in the habit a new rule of ſecretion.

Other writers oppoſe emetics as dangerous in the paroxyſm, but violent vomiting is not recommended; and the gentler motions of nauſea, with ſlight puking, are more likely to determine from the lungs than to encreaſe the flow of humours to that organ, as is very juſtly enforced by Dr. Foart Simmons, in treating of Phthiſis.

In this intention, if the ſubject be uncommonly vigorous for an Aſthmatic, and occaſionally in the ſecond ſpecies of the complaint, tartarized antimony, or antimonial wine, may be given. In other caſes, ſmall doſes of ipecac. are to be preferred. I have, in ſeveral inſtances, excited ſtrong vomiting at the approach of the fit, but not with that good effect which follows a gentle operation. R. B. took five grains of Tartariſed Antimony when the paroxyſm had juſt commenced. After violent evacuations upwards and downwards, with great preſent diſtreſs, the paroxpſm was lengthened by ſeveral exacerbations more than he had before ſuſtained. Greater weakneſs in the intermiſſion, and night ſweats, were, beſides, the conſequence for ſeveral days.

Diaphoretics.—Neutral ſaline medicines are given with advantage during the fit of the firſt ſpecies, and alſo of the ſecond. In the third ſpecies they are often uſeful. In the laſt they are manifeſtly hurtful.—Whenever they are uſed, the intention ſhould be to promote a gentle diaphoreſis, but not ſweating, which is always injurious, and particularly ſo if forced by heating ſudorifics.

Bleeding.—Many doubts occur on the propriety of bleeding in Aſthma, in any ſpecies of the diſeaſe. Before the pulmonary veſſels have relieved themſelves by their exhaling orifices, blood may poſſibly be drawn with ſome advantage, but when effuſion has taken place, a certain debility is indicated, and a loſs of contractile power in the veſſels, which prudence will rather ſubmit to during the fit, and attempt to remedy in the intermiſſion. In this ſtate of the diſeaſe, nature purſues the path beſt adapted to her circumſtances; the eſcape of ſerous fluid gradually relieves the veſſels, and reſpiration and abſorption muſt be relied on, with a ſalutary cough, to clear the air cells of the lymph. If evacuations of blood be directed, the ſudden depletion of the veſſels may leave their coats without the ſtimulus neceſſary to produce a contraction, equal to the ſpace which the blood had occupied; the heart will participate in the injury, and will alſo be deficient in vigour of contraction. If, therefore, blood is to be taken, it ſhould be drawn from the veſſels at intervals, and in ſmall portions, which would allow of a contractile power being exerted, in proportion as the veſſel loſes its contents, and ſo much fluid would not finally be taken away as to leave it without the ſtimulus of diſtention, ſo eſſential to its return of health.

But bleeding is an imprudent operation in every ſpecies of Aſthma, unleſs it be the ſecond. In the firſt ſpecies I have repeatedly directed it, but have never had reaſon to think that the paroxyſm was ſhortened an hour by the loſs of blood; and I have often been convinced that expectoration was delayed, and that more dyſpnœa remained in the intermiſſion than was common after former paroxyſms. In old people who have been uſed to the diſorder, it is certainly injurious. In the ſecond ſpecies there are occaſionally topical inflammations, which this operation may relieve; but if it be carried far, there is the ſtrongeſt reaſon to apprehend, that the patient may be plunged into Aſthma of the firſt ſpecies.

Diuretics.—Whether the great flow of watery urine from the kidneys be a critical diſcharge to relieve the lungs in the firſt ſpecies of Aſthma, or not, I have never ſeen the paroxyſm ſhortened by encreaſing it. The diabetes is alſo a ſymptom in the third ſpecies, and can be explained only from the ſtate of the firſt paſſages, which has been deſcribed.[*]

Notwithſtanding theſe doubts, diuretics have been recommended in Aſthma by phyſicians, antient and modern. Celſus[†] ſays, "profunt "etiam, quæcunque urinam movent."

"Hoffman's opinion is thus explained, "In ſtatu "cachectico, cui jungitur Aſthma magnam opem "ferre deprehenduntur diuretica."[‡] Rhodius[§] aſſerts, that after the ſpeedy diſcharge of thirty-ſeven pints of urine, the diſeaſe was cured. Baglivi ſays, "pluries adnotavimus, in pectoris morbis, "ſemper ducendum eſſe ad vias urinæ, natura id "monſtrante.[¶]

"As diuretics and quickſilver," ſays a writer of ingenuity, "have been famed for their ſervice "in the Aſthma, have we not reaſon to ſuſpect

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[*] Sect. x. xiii.

[†] Celſus, Lib. IV. Cap. 4.

[‡] Tom. III. Sect. II. Cap. 2.

[§] Lib. III. Obſ. 27.

[¶] Baglivi, Obſ. p. 103.

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"that an anaſarca, ſo obſequious to theſe remedies, is often the foundation of the Aſthma?"*

Floyer ſays ſwelled legs and copious urine are beneficial changes in the Aſthma.

Whatever ſpecies of Aſthma may be alluded to in theſe accounts of benefit from diuretics, I cannot think that any critical diſcharge is ſo uſeful as by expectoration in the firſt ſpecies. And we are to avoid impeding that event when diuretics are given; ſquill and vinegar coincide in both intentions.

In experiments with digitalis, I have proceeded to a doſe which induced ſymptoms, well known by practitioners, to mark the propriety of diſcontinuing its uſe; but I have not ſeen benefit from the exhibition. It has, however, been lately ſaid, on the reſpectable authority of Dr. Percival, to have been employed with advantage in Aſthma; and the reaſoning and experience of Dr. Ferriar corroborate this teſtimony of its good effects, when joined to ſmall doſes of opium. I cannot ſay preciſely in what ſpecies of the diſeaſe theſe phyſicians have uſed it, as the diviſions of Convulſive Aſthma propoſed in this Inquiry are not referred to.

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* Edin. Med. Eſſays, Vol. II. p. 326.

If urine be ſmall in quantity, and high coloured, ſaline diuretics ſhould be given, and mercurials are alſo then uſefully combined, as the caſe is probably complicated with viſceral obſtructions.

Issues.—The antients had always in view the ſerous defluxions in this diſorder, and endeavoured to intercept them deſcending from the head. This was the indication followed in the cruel practice of Ætius, who had ſo little ceremony in uſing the cautery, as to direct fourteen ulcers to be made and kept open at once, between the head and the diaphragm.

In very old Aſthmatics, iſſues are ſometimes neceſſary. When the diſeaſe is not inveterate, they may occaſionally be uſeful, by diverting aqueous humour from the lungs, and giving a better opportunity for the operation of tonic remedies.

When the diſeaſe is complicated with general dropſy, I have ſeen great advantage to the breathing, from their application in the thighs.

Antispasmodics.—Antiſpaſmodic medicines have no certain efficacy in ſhortening the paroxyſm of the firſt ſpecies of this diſeaſe. Exceptions may be made to this general remark, but they cannot be founded upon preciſe diſtinctions of the different ſpecies.

In the fourth ſpecies, which often appears in Aſthmatics, who may alſo be ſubjected to exciting cauſes, occaſioning a relapſe into one or other of the three former, antiſpaſmodics will be uſeful. Opium ſtands firſt, but its value is frequently enhanced by the addition of Æther. If theſe valuable medicines had been applied from a juſt diſcrimination of the different ſpecies of Aſthma, they would not ſo frequently have deceived the expectation of relief from their uſe; but ſuch a diſtinction could not take place till the indication of the convulſive actions being well underſtood, irritation, under different forms, were conſidered as the cauſe to be removed.

Calcined Zinc, which has been ſtrongly recommended, has been found in many trials perfectly inert and uſeleſs in the paroxyſm. And yet the antiſpaſmodic powers of this mineral have been proved in epilepſy, and the opinion of Gaubius on its virtues has been juſtified by the experience of many other phyſicians. If it be uſed in Aſthma, it can be only as a means of counteracting the habit of convulſion diſcovered in the fourth ſpecies.

In the intention of removing ſpaſmodic conſtriction, a numerous liſt of antiſpaſmodics has been tried in the firſt ſpecies of Aſthma, with little advantage. Valerian, cardamine, camphor, muſk, caſtor, beladonna, tobacco infuſion, extract of henbane, fetid gums, cuprum ammoniacale have been given in various doſes, more or leſs joined to other antiſpaſmodic, or tonic medicines, and combined with opium in large and ſmall portions, but in the firſt ſpecies, the paroxyſm was not ſuſpended, though frequently prolonged. In the Dry Aſthma (ſecond ſpecies) I have not made ſo many trials; but I can affirm, that no antiſpaſmodic is ſo uſeful in the beginning as nauſeating doſes of ipecac. with diaphoretics, in the caſes which I have had an opportunity of treating.

In the acceſs of a paroxyſm of the firſt ſpecies, R. B. took four grains of ſolid opium, which produced nearly an apoplectic ſtupor for two days. After a few hours the moſt debilitating ſickneſs came on, with inceſſant efforts to puke. The labour of the reſpiratory muſcles abated, but the wheezing evidently increaſed; a countenance more turgid than uſual, and intenſe head-ache attended. The pulſe was more ſtrong and quick for a few hours, but then ſunk into great weakneſs.

The paroxyſm ſhewed itſelf four hours earlier than uſual the next day, and two grains more were taken when it was perceived to commence;

reſpiratory labour ſeemed again to abate, but the anxiety encreaſed to an alarming degree, as the ſtupor became ſomething leſs. The pulſe was now weaker, and frequently irregular. Looſe motions ſucceeded, and a general ſweat. The energy of the paroxyſm then returned with exquiſite diſtreſs. A medical friend, who attended with great care to the progreſs of theſe trials, was alarmed, and endeavoured to promote puking, without effect. Bliſters were applied, and draughts of vinegar and pepper were given, interpoſed with ſtrong coffee and muſtard. The patient was at laſt brought back to a ſtate more uſual in former paroxyſms; but with every care there were nine exacerbations before the ſpitting becoming gradually more copious, concluded the fit. Notwithſtanding the unfortunate reſult of this experiment, the influence of doctrine, and the weighty authority there is for the exiſtence of a Spaſmodic Conſtriction of the bronchia, induced him to repeat it. He took two grains of opium in another paroxyſm after an active vomit, and bad conſequences ſtill enſued, though not ſo conſiderable. In the latter experiment, the extraordinary ſymptom of a moſt painful ſtrangury came on, which continued ſeveral hours.

Extract of henbane was ſubſtituted for opium in ſucceeding trials, but with no greater ſucceſs in the beginning, or height of the paroxyſm. In the ſecond ſpecies this narcotic produced reſt, when opium would not; but though the exacerbation was diſturbed, the paroxyſm was not ſhortened.

Muſk was given twice to a patient in the firſt ſpecies, in doſes of half a dram each. A perſpiration came out, but the anxiety and laborious reſpiration were not leſſened.—Camphor being added in equal quantity, heat was much encreaſed, with violent head-ache, pain in the ſtomach, and ſpaſtic twitchings in the intercoſtal muſcles, but with no relief to the breath. Plentiful dilution being uſed, the extraordinary ſymptoms ſubſided. Camphor was alſo joined with fœtid gums in many inſtances, without advantage, and where dyſpepſia was very predominant, theſe complicated forms always encreaſed it.

It is in the fourth ſpecies that antiſpaſmodics are given with the greateſt ſucceſs; and, I have little doubt of their general advantage, when this ſtate of Aſthma can be well aſcertained to exiſt. Vinegar, cordials and volatiles, may be combined frequently with narcotics, but the fœtid gums diſorder digeſtion, and alſo promote purging, which ſhould be avoided.

Opium and Æther are the moſt valuable of the claſs in this ſpecies, and their doſe muſt be proportioned to the neceſſity of the caſe. The judicious practitioner will frequently exhibit them in ſmall doſes, with as good an effect as can be obtained by large ones.

Opiates are occaſionally uſeful after emetics and aperients, in caſes where theſe inſtruments are employed.

Expectorants.—Theſe are a claſs of medicines uſeful in the firſt ſpecies of Convulſive Aſthma, in proportion as they are indicated. All practitioners are convinced of the neceſſity of employing them. Myrhh is certainly not an expectorant; and, however valuable as a ſtomachic, it has been of no uſe during the paroxyſm.

Ammoniac is a very valuable expectorant, but, when given alone, it is ſometimes too heating, and may therefore be properly united with a ſaline menſtruum. A compoſition of this kind, is, however, likely to purge, if not prevented by opium. Aſſafœtida, which has been much recommended by Dr. Miller, is ſtill more heating than ammoniac. He found it moſt beneficial when it puked the patient, but the diſeaſe that he deſcribes is not determined to have been the Convulſive Aſthma of adults, and the good effects which are mentioned, have never reſulted from its uſe under my obſervation. As puking was the effect of the medicine, we may perhaps ſee, in this operation, the means of relief, more than compenſating ſome bad qualities. It is alſo materially inconvenient to perſons who cannot be contented with a conſtant fœtor in the mouth, alvine diſcharges, and the air of the chamber.

The oily and demulcent expectorants, are not calculated for any ſpecies of Aſthma; the ſtomach of an Aſthmatic is already ſufficiently diſordered, and would be more ſo with the addition of theſe medicines.

Squills are very uſeful in the two firſt ſpecies of the diſeaſe. When united with vinegar, we obtain the medicine on which Floyer beſtows the greateſt applauſe. In many trials I have ſeen great advantages from vinegar of ſquills, in the firſt ſpecies of Convulſive Aſthma. It is moſt uſeful at the commencement of the paroxyſm, and then in proportion as it is attended with ſome little nauſea without diarrhæa. However much it may promote urine, this effect ſeems not to ſhorten the paroxyſm of Aſthma, whilſt its other powers have encreaſed expectoration, and probably excited abſorption.

Vinegar of ſquills is alſo a good medicine in the ſecond ſpecies, but I have remarked, that its power over the paroxyſm is then only in proportion to its emetic, or nauſeating effect. In the third ſpecies, unleſs it vomits, I can ſee no uſe in the exhibition.

Oxymel is only efficacious, as it contains vinegar or ſquill. Honey and ſugar are too fermentable for any ſpecies of Aſthma, and frequently impede the operation of better medicines.

Decoction of ſeneka is eminently uſeful in the firſt ſpecies, particularly to old people, but in the paroxyſm of young perſons, I have found it too heating. This diſtinction applies to Convulſive Aſthma, purely uncomplicated, and free from fever; but the diſeaſe is frequently obſerved in middle aged, and elderly perſons, to take the character of peripneumonia notha in the winter and ſpring, and ſeneka is then the moſt certainly uſeful medicine that I have tried, promoting expectoration, perſpiration, and urine, in a powerful manner.

Expectorants of heating qualities are generally improper in Aſthma; and in giving them it ſhould be recollected, that the ſtate of the ſtomach requires amendment. Nauſeating doſes partly coincide in both intentions; as their effect may be a gradual removal of the offenſive matters, which will be paſſed forward from the duodenum, and abſorbents, with bitters, may then be purſued with greater advantage.

Bliſters between the ſhoulders are not of deciſive uſe. They have been generally accompanied by medicines which might promote expectoration without them, and the uſual length of the paroxyſm is not diminiſhed by their application.

Inhaling Vapours.—Hippocrates introduced the inhalation of vapours from various herbs, and reſinous gums. He uſed herbs and nitre boiled with vinegar and oil, and directed the vapour of ſuch boiling compoſitions to be drawn into the lungs through a proper pipe. This practice was extended in many directions, and upon various indications of diſeaſe, as appears from many parts of his works.

Upon the indication of exceſs of ſerum, fumes were directed to be inhaled by practitioners, many ages after his time, for the purpoſe of drying the moiſture which was the cauſe of Aſthma, and alſo to carry off the remains of the obſtructing matter. Frankincenſe, myrhh, and many other gums, were in common uſe, with which arſenic was occaſionally mixed very injudiciouſly. But this application of the mineral, aroſe from the miſtake of taking the gum juniper or vernix of the Arabians, which, by their medical authors, was preſcribed in fumigation, under the name of ſandarac, for the σανδαράχη of the Greeks, which, doubtleſs, was an arſenical mineral.*

Inhaling of fumes has been ſuggeſted by modern phyſicians, both in Phthiſis and Aſthma. The vapour of æther, raiſed in the ſteam of warm water, has been often inhaled from the inſtrument recommended by Mr. Mudge, but without advantage in Aſthma. In the firſt ſpecies the ſymptoms were aggravated by its uſe, as we may preſume, from the greater rarefaction of the air contained in the lungs, and the more conſiderable expanſion of the fluids in the pulmonary veſſels.

The vapour ariſing from hemlock leaves infuſed in boiling water, was once found ſerviceable in the ſecond ſpecies of Aſthma, but always injurious in the firſt. In the laſt kind, its narcotic quality may be ſuppoſed to recommend its uſe, but antiſpaſmodics directly taken into the ſtomach, will act with more deciſion, and render other means unneceſſary. If there be virtues in ſome herbs, calculated to promote expectoration, the vehicle of aqueous vapour is not favourable to their operation; heat and moiſture conveyed into the lungs, being more likely to encreaſe the diſeaſe than to give relief.*

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* Vide Galen, Lib. IX.

Smoaking Tobacco is practiſed by ſome Aſthmatics, who miſtake the great excretion of ſaliva for a neceſſary evacuation. I am ſatisfied that a much more copious determination of lymph is made to the bronchia and ſalivary glands, by ſmoaking, and it will be entirely conformable to the actions of the œconomy, if the habit of ſuch ſecretion be eſtabliſhed, though this exciting cauſe be abſent. I have perſuaded ſome Aſthmatics to abandon the practice, with great advantage, in the firſt ſpecies. The ſyſtem cannot obtain the neceſſary ſupply of oxygen, ſufficiently faſt in the paroxyſm, even if the impurity of tobacco fumes be abſent.

Oxygen, Hydrogen, Hydro-Carbonate.—Thoſe who are beſt acquainted with pneumatic medicine, ſpeak in ſanguine terms of the effects of oxygen in Aſthma. "No ſooner does it touch the lungs," ſays Dr. Beddoes, "than the livid colour of the "countenance diſappears, the laborious reſpiration "ceaſes, and the functions of all the thoracic "organs go on eaſily and pleaſantly again."

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* The inhaling the vapour of redical vinegar from a glaſs veſſel has been well recommended. The proceſs and veſſel are deſcribed in Vol. III. of Dr. Duncan's Annals of Medicine.

Many authorities confirm the fact of benefit being derived from the inſpiration of this gas in Aſthma, but as there has been hitherto little diſtinction of the cauſes of this diſeaſe, pneumatic medicine has been tried from random indications; and hydro-carbonate and hydrogen are ſaid to be uſeful in Aſthma, as well as oxygen, though their properties are ſo different. Dr. Ferriar gives us an account of undoubted benefit from the uſe of hydrogen in Spaſmodic Aſthma, but the diſeaſe is ſaid to have taken place after inflammations in the thorax and adheſions of the pleura; ſhould it not, therefore, be included in the continued ſpecies, from fixed cauſes? In a caſe of this kind, oxygen would probably revive pain and inflammation by its ſtimulating properties, oppoſite to thoſe of hydrogen, which laſt could not be a permanent remedy.

I offer this ſuggeſtion with great deference to the judicious Phyſician whoſe authority I quote. He referred, without doubt, to the old diſtinctions of Aſthma, whilſt I reaſon from the principles of this Inquiry.

In the firſt ſpecies of Convulſive Aſthma, I have no doubt of the advantage of uſing oxygen in the paroxyſm; but I cannot expect a perfect cure from the continuance of this remedy only in the intermiſſion, though, here too, it may aid the general means.

I am well acquainted with the return of the diſorder in two inſtances, after the moſt favourable expectations having been entertained, from the relief afforded in previous paroxyſms.

In the ſecond ſpecies of Aſthma, I am informed by a phyſician of great accuracy and diſcernment, that oxygen appeared hurtful, encreaſing heat, anxiety, and producing temporary fever, when the pulſe was previouſly under 90. Hydrogen and hydro-carbonate were tried without benefit, and the fit vaniſhed by the patient moving out of town.

In a caſe where the firſt paſſages were affected with dyſpepſia, and the greateſt debility, oxygen was uſefully inhaled, though I cannot ſay what length of time was required to produce the good effect. I am informed only that the Convulſive Reſpiration appeared to belong to the third ſpecies; and that the patient enjoyed a better appetite, and ſuffered leſs in the paroxyſm from the inſpiring of oxygen, than he was uſed to do before he applied to it.

It is not always poſſible to aſcertain if irritation of ſerum exiſted in the lungs or not in the third ſpecies, when great acrimony offended the firſt paſſages, and had a decided influence in bringing on the fit. But if oxygen be really a remedy for dyſpepſia, it may be uſeful in this ſpecies, by invigorating the arterial and abſorbent ſyſtems, and thus eventually promoting periſtaltic action, and a better aſſimilation of alimentary matter. It has been rendered probable by M. Hallé, that oxygen is principally inſtrumental in performing thoſe combinations in the inteſtinal canal by which aſſimilation is produced.*

That it is uſeful in the paroxyſm of Aſthma, from irritation of mucus, may be inferred from a conſideration of every circumſtance of prediſpoſition to the diſeaſe, and ſtill more from its proximate cauſe.

If oxygen be inſpired, it may act directly upon the capillary orifices, and excite them by its properties to contract their apertures, and thus prevent the further exit of their ſerous contents. If its ſtimulating qualities were to be applied to the arterial trunks only, they might propel the blood with unuſual force, and the capillary extremities not being equally excited, the diſeaſe might be encreaſed; but in ſpeaking of this diffuſible and ſubtle fluid, we cannot apply the ſame reaſoning as to other powers operating upon the œconomy of life; we are to conſider that it is a neceſſary conſtituent of the blood in its healthy ſtate, and we have facts to depend upon, which prove its efficacy in appeaſing the diſtreſs of a paroxyſm of Convulſive Aſthma.

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* See La Medicine Eclairee, &c. par M. Fourcroy.

We are alſo to conſider that it may be made to penetrate more extenſively, and deeply, into the air cavities, by being inſpired in greater proportions than it can be afforded by a common atmoſphere, ſo that the points of vaſcular texture, uncovered by mucus, may be expoſed to a greater influence, though they be fewer in number, than in the healthy ſtate of the lungs.

Its application gives to the pulmonary veſſels, and to the heart itſelf, that vigour which ſends the blood to the left ventricle, and the anxiety and ſtraitneſs, are in proportion diminiſhed: but it is carefully to be remarked, that expectoration ſtill terminates the fit in a greater or leſs degree in the firſt ſpecies, which comprehends ſo large a majority of the caſes of Convulſive Aſthma. See Sect. IX. for additional reflections upon its uſe.*

Stomachics.—Theſe remedies are abſolutely neceſſary in Aſthma to correct the dyſpepſia in whatever ſpecies it may appear. Bitter tinctures are not to be uſed in the paroxyſm, but teſtaceous powders are generally beneficial. Acetous acid is particularly grateful to the ſtomach, and appears to ſtop the tendency to fermentation, at the ſame time that it excites abſorbing action and invigorates the organ. It is obvious, that cretaceous powders ſhould not be exhibited at the ſame time, but it is fully confirmed by experience, that both eminently counteract the flatulence and diſtention.

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* See the Rev. Mr. Townſhend's Guide to Health, Vol. I. for additional evidence of the uſe of oxygen in Aſthma.

Additions of ſtimulant, or heating properties, are out of place till the third day, when the patient uſually begins to mend in the firſt ſpecies. Generally ſpeaking, after the third day of the paroxyſm, any particular bitter, or cordial ſtomachic, will be uſeful in all ſpecies of ſimple Aſthma.

The mixture propoſed by Dr. Griffiths, of myrhh, kali, and vitriolated iron, is a ſtomachic, of great uſe between the fits, when the prediſpoſition is to be cured.

Vinegar is a moſt uſeful medicine in the paroxyſm of the firſt ſpecies. In the acceſs of the fit it may be united with ſquill, or ipecacohana. Afterwards, according to the progreſs of the complaint, æther may be added in the firſt and the third ſpecies, but in the ſecond it is too heating. When opium is given, it ſhould be united with this acid.

Vinegar would have been found much more uſeful than it has appeared to be in this diſorder, if it had been leſs combined with ſacharine and aceſcent ſubſtances. I have ſeen the paroxyſm, in the firſt ſpecies, relieved by vinegar, ſimply united with water, when oxymel was uſeleſs or injurious.

The effect of this acid upon the lips, which it renders pale and ſhrivelled,* ſeems to indicate a quality ſtimulating the abſorbing veſſels to encreaſed action; and it is thus that its operation in Aſthma is probably to be explained: there may be other reaſons given for its good effects, but not ſo clearly eſtabliſhed.

M. Achard† found, by experiment, that vinegar, of all ſolid or fluid perfumes, phlogiſticated the air the leaſt.

The uſe of chalk in Aſthma ſeems to ariſe from the great diſorder in the ſecretions of the firſt paſſages. I conclude, that the capillary orifices of the ſtomach pour out a fluid in too great quantity, ſhewing that its coats are morbidly relaxed, in which ſtate the ſecreted juices may require correcting, and the ſecreting veſſels may demand ſome appropriate aſtringent to excite their contractions. Whether chalk anſwers this laſt purpoſe or not, we may attribute to it the property of an abſorbent, and it is as advantageous in Aſthma of the firſt and third ſpecies, and occaſionally in that of the ſecond, as it is in diarrhæa.

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* As is ſomewhere obſerved by Dr. Darwin.

† See Journal de Phyſique, par M. L'Abbe Roſier, Tome 26.

It has not, however, been generally the cuſtom to uſe abſorbents, becauſe practitioners have hitherto merely conſidered difficulty of breathing, without referring the ſymptoms which conſtitute that ſtate to their true cauſes.

In Aſthma of the third ſpecies chalk has admirable effects; it ſhould be firſt given in a neutralized draught, after a gentle puke. Rhubarb ſhould be interpoſed, and after two days, opium being added, will ſometimes prevent another exacerbation. I have even ſeen this effect produced on the ſecond day, but not without a previous evacuation from the firſt paſſages, and a very free uſe of chalk.

Stimulants. — The ſtimulants which have been ſo profuſely uſed in practice within theſe few years, have been applied in all ſpecies, and all ſtages of Aſthma. In the paroxyſm of every ſpecies in which the irritation was not diſcharged, their exhibition has frequently done miſchief, and not uncommonly induced a neceſſity of bleeding, which has been erroneouſly attributed to the natural indications of the diſorder.

I have never yet ſeen æther give eaſe in the acmé of the paroxyſm of Convulſive Aſthma of the firſt ſpecies. In many trials the anxiety and the energy of reſpiratory labour were certainly encreaſed by it. If the irritation ariſe from repelled gout, the caſe may be more ſuſceptible of benefit from its uſe, but this caſe ſhould be diſtinguiſhed from thoſe of diſorders in the alimentary paſſages which cauſe the paroxyſm in the third ſpecies.

The acrimony of indigeſted aliment, offending the ſtomach and duodenum, have certainly produced, in many ſubjects, the reaction of the ſyſtem in a paroxyſm of Aſthma, which ſhould be claſſed in the third ſpecies; but in this caſe ſaline abſorbents are infinitely to be preferred to the hot and ſtimulant draughts of volatile ſalts, æther, and fetid gums, the bad effect of which is too often only diminiſhed by the rhubarb or aloes which are fortunately admitted in the compoſition.

In the paroxyſm of Convulſive Aſthma, a writer of great authority recommends a tea-ſpoonful of æther three or four times, to which he adds ten drops of laudanum. We have likewiſe a direction to apply a bliſter, to give an emetic, and to bleed. It is difficult to ſay what natural ſymptoms of the *ſame diſeaſe* can indicate ſuch contrary remedies; and we can only be ſatisfied by reflecting, that Convulſive Aſthma has never yet been referred to its diſtinct and characteriſtic cauſes, and that the indications may in one ſpecies call for a medical agent that cannot be applied in another, in which, even one of an oppoſite quality may be required.

In ſaying this, I endeavour to account for the ſucceſs which may occaſionally attend on each plan; as, from long knowledge of the admirable abilities of Dr. Darwin, I fully confide in the judgement of his directions.

But though ſtimulants be miſplaced in the paroxyſms of three ſpecies of Convulſive Aſthma, they may be uſed with advantage in the fourth, if joined with opium, and poſſibly other narcotics.

They are alſo occaſionally beneficial in the intermiſſions of the firſt and third ſpecies, as a means of exciting digeſtion, and the general powers of the habit, particularly of the abſorbing ſyſtem. The intention in which they are to be given will determine the phyſician in his choice.

Bathing.—Warm bathing is hurtful in every ſpecies of Aſthma. Not contented with probability, R. B. went into the hot bath both in the intermiſſion and the paroxyſm. The reſpiratory diſtreſs was much aggravated by the trial in the laſt ſtate, and the paroxyſm was excited in a few hours, and at an unuſual period, by the trial being made in the intermiſſion.

The cold bath has been judiciouſly recommended by Dr. Ryan, in Aſthma. I believe there is no ſingle remedy of more value in all ſpecies of the complaint during the *abſence of the paroxyſm.* I can aſſert this upon numerous trials of its efficacy.

In the paroxyſm, R. B. went into a bath of forty-ſix degrees of Farrenheit. It required ſome firmneſs to make the attempt, and great patience to bear the ill ſucceſs of it. The ſudden abſtraction of heat was evidently injurious; and it was ſome hours before the impreſſion was ſo far overcome as to take away fears of the conſequence.

Tonics.—Tonic medicines, if we ſeparate a claſs of ſtomachics from this general head, cannot be reaſonably expected to be uſeful in the paroxyſm of Aſthma. They have been applied partially, and abandoned capriciouſly by many practitioners, in caſes of Aſthma, during the intervals.

But a deſideratum has always been a proper diſtinction of ſpecific cauſes. If tonics be given in caſes of diſordered reſpiration ariſing from ſecret vomicæ, adheſions of the pleura, and many other cauſes of Continued Aſthma, what conſequence can be expected, but encreaſe of diſeaſe? The recollection of every practitioner will enable him to allow, that inſtances of this complicated kind have been confounded more or leſs with Convulſive Aſthma of noſologiſts; and when iron, or Peruvian bark have been exhibited, theſe valuable medicines have met with unmerited diſgrace.

But, beſides this cauſe for the rejection of tonics, the want of firmneſs in continuing the uſe of them, when properly indicated, is a great ſource of their diſcredit.

If a febrile affection come on during a courſe of ſteel or mineral water, the medicine is probably diſcarded never to be reſumed.

Peruvian bark may load the ſtomach, and bring on dyſpnœa in one preparation; it is then abandoned without trying another of lighter digeſtion, and more divided parts.

I can affirm, that in the intervals of the paroxyſms of the firſt, third, and fourth ſpecies of Aſthma, tonics are generally beneficial: and I am of opinion, that a temporary inconvenience from the uſe of one form, ſhould incite the phyſician to find another, and apply it, never abandoning the general intention.

In the ſecond ſpecies their advantage is more doubtful, and their exhibition muſt be decided upon by careful attention to remote cauſes.

In purſuing, conſiſtently, a courſe of tonic medicines in this diſeaſe, the phyſician muſt prepare his patient for the neceſſity of long perſeverance. A prediſpoſition is to be cured which conſiſts radically in laxity of fibre, and conſequently in feeble vaſcular contraction. This ſtate has been growing very probably for years, and the expectation of removing it in as many weeks, or even months, is puerile, and not to be defended.

It is almoſt as rational to promiſe, that a remedy ſhall confer upon the ſoft fibre of an infant muſcle, the premature denſity and tone of adult growth.

In the firſt and third ſpecies of Convulſive Aſthma, the practitioner may be ſafely referred to all medicines which belong to the claſs of tonics, which may be taken up and ſuſpended, or variouſly combined, according to his judgement. Too long uſe of one form diminiſhes its influence, whilſt another will continue the impreſſion with greater effect.

In the choice of tonics, the preparations of iron are to be preferred as eſſential means of cure. Theſe ſhould be occaſionally aſſiſted by bitters and Peruvian bark, and the ſtate of dyſpepſia is never to be overlooked, but obviated by frequent interpoſition of abſorbents and rhubarb. Opium is alſo required to tranquillize occaſional uneaſineſs from the new excitement of preparations of iron. Oxygen is too well recommended upon principles cloſely connected with the prediſpoſition and remote cauſes of Aſthma, to omit its uſe, by modes of exhibition now generally known.

I have tried calcined zinc in ſeventeen paroxyſms, and more intermiſſions, without being able to diſcover the ſmalleſt advantage from its operation. In general it loaded the ſtomach, when given in a full doſe. The accounts we have of its efficacy muſt be aſſigned partly to enthuſiaſm, and more generally to the want of diſcrimination of the ſpecies of Aſthma, and the erroneous interpretation of the cauſes which terminate the fit. Theſe are more or leſs dependent on the denſity of the atmoſphere, and changes in its degrees of purity, and frequently on the condition of the firſt paſſages, hitherto greatly neglected in treating the diſeaſe.

SECT. XVI.

A plan of treatment traced out for the Paroxyſm *of each ſpecies.—General rules of diet for the paroxyſm and intermiſſion.*

IN a paroxyſm of Convulſive Aſthma, we are firſt to conſider what ſpecies of the diſeaſe it belongs to, and next the indications which are to direct us in the treatment.

Paroxyſm of the Firſt Species.—The indications are to leſſen the diſtention of the pulmonary veſſels, by determining the blood to the ſurface of the body: to accelerate the paſſage of the blood from the right to the left ſide of the heart: to remove the extravaſated ſerum already preſent, by abſorption, exhalation, and mucous expectoration: to correct dyſpepſia, and encreaſe the tone of the firſt paſſages.

In anſwering the indications of every ſpecies of Aſthma, we are to employ the inſtruments propoſed in the laſt ſection, with the practical cautions there recommended.

By gentle puking we may obtain ſome knowledge of the extent of dyſpepſia as a remote cauſe, and the paroxyſm will go on with milder exacerbations, if irritating matter be removed from the ſtomach and duodenum. Afterwards a draught with one ounce of diſtilled vinegar, and three grains of pulv. ipecac. in pure water, may be taken every four hours, as a means of determining to the ſurface of the body, and promoting abſorption and exhalation. If coſtiveneſs prevail, it will be neceſſary to remove it, carefully avoiding purging.

Inſtead of acetous draughts with ipecac. the phyſician may have reaſon to prefer chalk or magneſia uſta in a draught of mint water, with the ſame nauſeating ingredient. The indication of diſorder in the firſt paſſages, will determine him in his choice.

To accelerate the paſſage of the blood to the left ventricle of the heart, beſides theſe means, oxygen may be inſpired, diluted according to the rules of Dr. Beddoes. In the morning no time ſhould be loſt in ſupplying the patient with clear coffee, as ſoon as he awakes, which ſhould be repeated at intervals with dry toaſt.

The patient may alſo take during the remiſſion, a bolus of pulv. columbo, with a few drops of tinct. opii. every three hours, and infuſion of coffee or camomile; the nauſeating draught being ſuſpended between the exacerbations.

At the beginning of the ſecond exacerbation the nauſeating draught ſhould be repeated, at firſt with a ſufficient doſe of ipecacohan to excite puking, and afterwards without that effect. In the ſecond remiſſion, the plan purſued in the former ſhould be reſumed. The third exacerbation will be probably mild, after which the acetous draught may be frequently united with æther in place of the ipecacohan. With this plan there will appear on the third day, a conſiderable tendency to expectorate, which ſhould be promoted by ammoniac, with vinegar of ſquill and tinct. opii, or with volatile ſalts. Ammoniac is called an expectorant, but the patient, before this period, too frequently takes this nauſeous medicine without uſe.

From this time, bitter infuſions of myrhh, columbo, or quaſſia wood, may be given with great advantage, more or leſs united with abſorbent earths, magneſia, or vinegar. If the exacerbation ſtill return in the evenings, it may be proper to continue the nauſeating medicine at the hour of its attack, except in Aſthmatics, who, from having frequently ſuſtained the paroxyſm, may probably be chiefly influenced by habit.

When this is aſcertained, a conſiderable doſe of opium, with æther and volatiles, is the ſpecific remedy.

Paroxyſm of the Second Species. The indications are to diſcharge the ſubtle and acrid particles which have been received in inſpiration, or to promote ſuch a ſecretion of lymph as may invelope them, and thus defend the membrane from their further irritation; and laſtly, to remove the patient from the ſphere of their influence.

The firſt intention is not readily accompliſhed by art, and whatever claims may be made to the honor of curing paroxyſms of this ſpecies, nature is often the patient's only friend. The irritating offence will naturally encreaſe the action of the bronchial veſſels, their lubricating lymph will be ſecreted to ſheathe the paſſages from further injury; and this event frequently takes place without any thanks being due to medicine; it may, however, be promoted by ſaline and antimonial diaphoretics, and nauſeating doſes of ipecac. adding tinct. opii, when the paroxyſm declines.

A change of the wind may likewiſe ſave the patient every trouble in executing the laſt intention, but if this relief do not come, it will be neceſſary to direct a different reſidence.

Paroxyſm of the Third Species. The indications are to diſcharge irritating matter from ſome of the hollow viſcera below the diaphragm.

The diagnoſtics, it muſt be confeſſed, are here often difficult to aſcertain. But if the diſorder do not belong to this ſpecies of Aſthma, we muſt aſſign it to the firſt, and the ſame preliminary treatment may be ſafely purſued. After one gentle emetic, an opinion may be formed with more preciſion, whether pulmonary irritation be preſent as well as abdominal, which may be diſcovered by the cough that attends in both; and alſo from the meaſure of relief which is obtained by emptying the firſt paſſages. In the firſt ſpecies the cough is ſo ſmall and painful as to be ſuppreſſed by voluntary efforts In the third it is more open, but equally without expectoration, as in the beginning of the other.

The conſiderations, analogies, and facts of Sect. XIII. may direct the inquirer further in the diagnoſtics of this ſpecies.*

As we conſider this ſpecies to depend much on diſorders of the lower viſcera, the turgid ſtate of the liver may be a frequent cauſe, both creating dyſpepſia, and following it. It may be therefore neceſſary, in ſome caſes well underſtood from former circumſtances, to give crude quickſilver triturated into a bolus with conſerve, or calomel with rhubarb. But generally we are to purſue the moſt quiet means of diſcharging acrimony, or altering its qualities, in which laſt intention, chalk probably acts with ſo much benefit, as well as the volatile and fixed alcalis.

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* On the ſame ſubject ſee the Appendix.

After a moderate evacuation, if the habit of convulſive contractions be of long ſtanding, an opiate may be given with great propriety; but in young Aſthmatics, if the offence exiſt only in the alimentary canal, the paroxyſm may be ſuſpended, or the exacerbation be ſo mild as not to diſtreſs the patient. Whether this ſtate be obtained by the operation of an opiate or not, abſorbent earths are eminently uſeful, and ſhould afterwards be continued through exacerbations and remiſſions, in a vehicle ſaline and bitter, and opium, with æther, or not, may be added, as judgement may direct.

Paroxyſm of the Fourth Species.—The indications direct us to make ſenſation leſs acute, or by diverſifying impreſſions, to break the chain of perceptions, connecting themſelves in the mind with the primary cauſe.

To be correct in diſcriminating this ſpecies, is not always poſſible; but that there is reaſon for the eſtabliſhment of it, is proved by the analogy of all convulſive contractions; by paroxyſms returning upon ſuch minute cauſes of offence, as to be traced with difficulty, and at laſt only through the links of mental aſſociation of ideas.

Here we ſee the uſe of opium and other antiſpaſmodics; their influence on animal ſenſation prevents the effect of ſlight irritations, which, though not likely to endanger a function, might excite muſcular convulſions, but for their exhibition in habits already diſtinguiſhed.

It has been ſhewn that this may ſupervene upon each of the former ſpecies. Nature or art may have removed the irritating offence, but convulſive motions may ſtill continue, at greater or leſs intervals. In the firſt ſpecies, and in the third, it may be pretty well concluded, that the recurrence is owing to habit, if the patient be conſiderably improved in health, if dyſpepſia be greatly diminiſhed, and if expectoration and wheezing do not terminate the fits.

But no diagnoſtic is ſo ſtrong as the effect of medicine. According to circumſtances, opium and æther may be employed in large doſes, and in the alteration of ſymptoms which has been deſcribed, theſe antiſpaſmodics are inſtantly uſeful.

Diet.—The Aſthmatic ſhould avoid the Errors in Diet pointed out as exciting cauſes in Sect. IX.

His food ſhould not be generally fluid or weak. In the ſecond ſpecies there is the neceſſity of a perſpiring ſtate of the body, but the ſtomach requires ſolids, even in that. Vinous drinks ſhould be avoided particularly in the paroxyſm of the firſt ſpecies, and watery gruels and broths are equally bad, if taken largely. Whatever is ſtomachic is proper, if it do not ſtimulate. Acidulated water, milk and water, with toaſted bread, or biſcuit, rice boiled in broth, till it be ſoft, without fat, are ſuited to the paroxyſm.

Infuſion of coffee may be conſidered as medicinal in every ſpecies of Aſthma except the ſecond, in which it is too heating for common uſe. It is beſt in the firſt and third ſpecies, in both which dyſpepſia is ſo predominant, as to make the treatment of one not inapplicable to the other. Sir J. Pringle ſpeaks of it in the paroxyſm as a moſt powerful medicine, and directed it in the proportion of one ounce to a diſh, without mixture, and to be repeated every half hour. Dr. Percival gives his authority for the uſe of coffee in Aſthma, as a ſucceſsful means of relief. Sir J. Floyer uſed it with great benefit in the latter part of his life, as appears from the account of Dr. Muſgrave.

If coffee be boiled, it loſes part of its flavour; it ſhould, therefore, be infuſed like tea, by pouring boiling water upon it in a cloſe pot.

From the cloſe of one exacerbation to the beginning of the next, a more cordial aliment may be uſed, but not ſo exciting as in the intermiſſions of the paroxyſm. Coffee and ginger tea are the moſt cordial articles which ſhould be allowed. Hot liquors are always improper; cold water is taken with great benefit, and if acidulated with vinegar, its good effects are often more conſiderable.

Pure cool water is moſt clearly beneficial after an imprudent meal. If the Aſthmatic perceive his ſtomach to be loaded, he may next expect the ſymptoms of a paroxyſm. In theſe circumſtances I have experienced, very frequently, the advantage of repeated draughts of cold water, ſo that one or two quarts have been taken in the whole, from the commencement of the uneaſineſs; and this has given perfect relief when coffee had failed.

It is particularly neceſſary not to oppreſs the ſtomach by more than it can govern: but it is not leſs important in an advanced ſtate of the diſeaſe, to ſupply it with tender animal food and light wine. Examples of this are numerous, and a ſpecimen of the cordial diet is given with clear evidence of advantage from it by Dr. Whytt.*

The practice of taking rich ſoups and broths, is very injudicious in all ſtages of Aſthma. The veſſels are both filled and relaxed by ſuch a diet, and the ſtomach is not improved by their uſe. To be more particular would be a repetition of the cautions as to Errors of *Diet*, in Sect. IX.

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* Obſerv. &c. on the Cure of Nervous Diſorders, p. 502.

SECT. XVII.

The Prediſpoſition removed and the diſeaſed cured.—Examples of the practice.—Concluſion.

WHEN the paroxyſm has ſubſided, we are to proceed with a further application of remedies indicated by the remote cauſes. This part of the practice has been little attended to,* though it is only by removing the prediſpoſition, that the diſeaſe can be cured.

It is therefore our duty to urge the neceſſity of counteracting the exciting cauſes, and to ſhew in what condition of the body they may produce their effects. Unleſs this honeſt ſolicitude of the phyſician be anſwered by the confidence and ſubmiſſion of the patient, the latter cannot be inſured againſt the future attacks of Aſthma, though a paroxyſm may have terminated in the moſt perfect intermiſſion; nor can any blame be reaſonably attached to his adviſer, if the diſorder return.

The reader may anticipate the plan of cure, if he have attended to the obſervations on the prediſpoſition and exciting cauſes of the firſt ſpecies, which takes in ſo large a majority of caſes. He is referred to Sect. X, XI, XII, XIII. where the *nocentia* are pointed out, from which counteracting means may be deduced. The remedies mentioned in the 15th ſection may further aſſiſt his views, if he particularly notice oxygen, ſtomachics, and tonics.

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* See Tonics in Sect. XV.

In the *Firſt Species* it is obvious, that the proper indications can be only anſwered effectually by the uſe of medicines, which give a contractile tone to the pulmonary capillaries, encreaſe the power of the ſtomach and bowels, and promote abſorption and ſtrength through the whole habit.

For theſe purpoſes iron, cold bathing, exerciſe, change of air, oxygen, bitters, Peruvian bark, abſorbents, and acids, are to be firſt recommended, and theſe diverſified according to their effects, will prevent the recurrence of paroxyſms, by altering the condition of body in which they are excited.

We muſt continue the uſe of abſorbents from the cloſe of the paroxyſm, employing magneſia when the body is coſtive, but preferring chalk in common inſtances. This medicine given in bitter infuſions, will oppoſe dyſpepſia as a temporary relief, but muſt not be relied upon for a more extenſive advantage. The preparations of iron are to be given at firſt in ſmall doſes, and afterwards in larger. If heat or pain occaſionally attend, we muſt, during theſe ſymptoms, ſuſpend their uſe, and ſubſtitute ſaline draughts with opium.

When the paroxyſm threatens to appear, the exhibition of theſe tonics muſt be again ſtopped, and the plan ſhould be purſued which has been pointed out in the laſt ſection.

Every preparation of iron may be uſed in the intervals of the paroxyſms, but the rubigo ferri is much to be preferred. The directions which are given by Lewis and Cullen, and other writers on the materia medica, are well known, and ſhould be generally obſerved in preſcribing this mineral.

I have many proofs of the greateſt advantage from a patient continuance of this plan, but a ſhort caſe is ſufficient to exemplify the treatment.

A clergyman forty-eight years old, had been ſubject, ſince his thirtieth year, to this ſpecies of Aſthma. I had ſeen him in two paroxyſms; and, after the laſt, I ſucceeded in engaging his attention to a courſe of medicine to prevent a return. A powder of crab's claws, rhubarb, and pulv. aromat. was directed to be taken every day after dinner, and to be repeated occaſionally, if the diſordered ſtate of the ſtomach required it. I alſo preſcribed as follows:

R. Ferri Vitriolat. pulv. ℈ſs.
Extracti Chamæmeli ʒiſs.
Ol. Cinnanomi gutt. iv.
Mucilag. Gummi Arab. q. s. Fiant.
Pilulæ 30.

He took three of theſe pills twice a day, with an infuſion of columbo root and ginger for ſeveral weeks, when the paroxyſm returned, during the continuance of which they were ſuſpended. At the cloſe he reſumed them. After a few days they were changed for ten grains of rubigo ferri, twice a day, and five grains of rhubarb were taken every night: the cold bath was alſo uſed every other day; his diet was more cordial, and he was indulged with porter. After a perſeverance in this plan for ſome time, his medicines were occaſionally ſuſpended, and frequently changed into other forms of the ſame claſs. He afterwards bathed in the ſea for ſeveral weeks. He was uſed to ſuſtain twelve paroxyſms in the year, but he has now been free from them many years, and carries every mark of health, with a perfect freedom of digeſtion and breathing.

In the *Second Species*, exhalation ſhould be kept up from the veſſels of the lungs by the uſe of diaphoretics. Small doſes of opium are uſefully conjoined, and the patient ſhould be removed from the influence of irritating cauſes, ſuch as are known to exiſt in towns and manufactories.

The Dry Aſthma ſeldom occurs under the diſtinctions before marked out. It is not a diſeaſe which follows ſuch dangerous debility as the firſt, but it is more ſubtle and capricious in its attack, and leſs uſefully influenced by the action of tonics, which may frequently be injurious by encreaſing the abſorption from the pulmonary membrane, and conſequently its dryneſs, and by this means laying it more open to offence. It may be ſeen in the progreſs of convaleſcence from the firſt ſpecies, and is then an indication of tonics having performed their part, and of the propriety of ſuſpending them.

A gentleman had been many years ſubject to this ſpecies of Aſthma, which uſually terminated in ſome little expectoration, and when the tracheal paſſages became moiſt, the paroxyſm began to ſubſide; at length he left a populous town on account of its frequent returns, and went into country lodgings only one mile diſtant. He was there free from his complaint, except the wind blew from the town, which brought on a paroxyſm in two hours from the change, in ſix inſtances. When the wind blew again from the country, although eaſterly, the paroxyſm ſoon went off.

At length he removed two miles further, and in this ſituation entirely loſt his complaint, taking ſmall doſes of opium and abſorbents, which prevented irritation from very ſlight offence, and corrected his digeſtion which was faulty: but the grand means of cure appeared to be a ſituation more remote from the origin of effluvia, which could not then arrive at his lungs, but in ſo diluted a ſtate as to loſe their influence.

In all caſes of this kind there ſhould be very particular enquiries made as to the nature of the ſituation in which the patient lives. There may be many unſuſpected cauſes for his ſufferings; but, by retreating from ſome local inconvenience, theſe may altogether ceaſe, and the occaſion of their former exiſtence be very manifeſt.

The *Third Species* is to be cured by the means generally propoſed in the firſt, but with a more free uſe of abſorbents, and a more rigid attention to diet. Chalk and Opium will aſtoniſh the Aſthmatic by their excellent effects, when the irritation proceeds from diſorder of the firſt paſſages only. Of irritation in the uterus, an example was given in Sect. XIII. I have no doubt of the fact, that acrimony ſometimes gradually, accumulates in the ſtomach and duodenum, until a paroxyſm is excited without other irritation; but more extenſive obſervation, with reference to the principles here laid down, is neceſſary to ſettle clearly the diſtinction between the firſt and third ſpecies.

R. S. aged forty, of rather a full habit, but pale ſkin, applied to me. I found that he had ſuffered many paroxyſms of Aſthma, clearly conſidered convulſive by his friends and medical adviſers. Theſe were preceded by puking, flatulence, and acidity of the ſtomach, with other ſymptoms of dyſpepſia. I directed the following draught to be taken three times day: viz.

R. Pulv. Cretæ ʒſs.
Tinct. Opii gutt. xv.
Ætheris Vitriol. gutt. 40.
Infuſi Flor. Chamæm. ℥iſs.
Tinct. Columbo ʒii. m.

A few grains of rhubarb were alſo taken every night at bed-time. He had been affected with a diarrhœa, which ſometimes preceded, and at other times followed his paroxyſm, without regularity. The diſorder of the firſt paſſages was ſoon checked, and the returns of the paroxyſm were delayed by the medicine. Afterwards a courſe of iron, with other tonics, was purſued with great ſucceſs in confirming the habit, and finally curing the diſeaſe; as I have recently been informed that no paroxyſm has occurred for the four laſt years. I infer, therefore, that its cauſe muſt have exiſted in the firſt paſſages; and I think this, and many ſimilar caſes can only be explained by referring to thoſe principles of the animal œconomy regulating muſcular contractions which were conſidered in Sect. XIII.

The cure of the *Fourth Species* muſt be attempted upon principles ſuggeſted in Sect. XIV; the application of which will not be difficult when the diagnoſtic is well eſtabliſhed by the effect of antiſpaſmodics, and the progreſs of certain convaleſcence. The influence of external impreſſions muſt be maturely conſidered. Tonics have frequently removed the weakneſs of an Aſthmatic, and a change of ideas, aided by the uſe of opium, to abate ſenſibility of ſlight irritations, would have ſecured him from relapſe, if the exertion had been recommended, or its neceſſity foreſeen. A neglect of theſe means may be conſidered in many inſtances as cauſing the return of convulſions of the muſcles of reſpiration. This truth might be ſupported by the evidence of ſeveral caſes within my knowledge, but I ſhall give the following as an example particularly under my obſervation.

R. B. enjoyed general health in various ſituations till the year 1783, when dyſpepſia firſt attacked him at twenty-five years of age. The ſymptoms encreaſed gradually for four years. He was hypochondriac, ſleepy after meals, and had conſtant pains in the intercoſtal muſcles.

1788.—His eyes were conſtantly inflamed, and a ſtupor came on every night, which made reading very painful. He had lived upon a weak and fluid diet, and had taken ſaline medicines injudiciouſly.

In the ſummer of this year, after awaking in the morning, he perceived ſome wheezing in his expirations, but no dyſpnœa.

In the autumn, after a catarrh, and fatigue in riding, he was ſeized in the uſual manner, with a paroxyſm of the Convulſive Aſthma of the firſt ſpecies.

In the ſucceeding winter he had ſeveral paroxyſms, and tried the means of alleviating them, pointed out in the preceding ſections. His experiments frequently prolonged their duration, and the intermiſſions were neglected.

For four years this diſeaſe preſerved its character, and was remarkably excited by the following remote cauſe:—The pariſh of Solyhull is the higheſt part of Warwickſhire, from which rivulets deſcend to the eaſtern and weſtern oceans. The ſoil is gravelly, but always moiſt with ſprings; the air is light, and continual evaporations make it cold. He was frequently called to this ſpot by the ties of family, or motives of buſineſs, from a reſidence forty miles diſtant, and two hundred feet nearer to the level of the ſea. In his firſt viſit, after he had ſuffered the Aſthma, he was ſeized with a very ſevere paroxyſm on the evening of his arrival. He was laid up during his ſtay, and the ſymptoms had not ſubſided when he purſued his road back. As he deſcended from the high country, the dyſpnœa gradually went off, notwithſtanding great fatigue. In the courſe of the four following years he repeated this journey, in warm and cold weather, and under various circumſtances, ſeven times, but with the ſame reſult in every attempt.

1792.—He had tried numerous remedies in the paroxyſm, and had attained ſome advantage over it.* Dyſpepſia was leſs, and his general health improved, but he had not yet ſucceeded in lengthening the intervals.

He now purſued, more vigorouſly, the plan which he had adopted. He took iron in large doſes, and in all preparations, but preferred the ruſt, which ſeemed to correct dyſpepſia more effectually than any other. He went into the cold bath every other morning, and took abſorbents occaſionally with bitter infuſions, and rhubarb.

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* See the two preceding Sections.

In the ſummer dyſpepſia had greatly abated, and the intermiſſions became longer. In October he went to Bath, and drank the water a few weeks with great benefit. Upon his return he reſumed his tonics, and truſted chiefly to the ruſt of iron, taking chalk very ſeldom. The cold bath was ſuſpended in the winter.

1793.—Some boils had appeared in the laſt year, and they now ſhewed themſelves more frequently upon his face and body. The paroxyſm did not come on ſo often, but was excited by fatigue or cold, and by profeſſional buſineſs, which he now determined to abandon, rather than his hopes of a perfect cure.

1794.—In the winter he was very free from diſordered reſpiration, which he attributed to excurſions and change of ideas, in new purſuits. In the ſpring he had two ſevere returns, excited once by the duſt of oats, and a ſecond time by hair powder, but he expectorated little, although dyſpnœa ſubſided with the paroxyſm. His diſeaſe now approached the character of the ſecond ſpecies, and the change was conſidered favourable. He alſo applied the principles of Sect. XIV. to theſe attacks, and ſecretly determined to oppoſe them in future by ſedatives, which he had long diſcarded as uſeleſs in this intention.

An opportunity occurred twenty days after, when he completely ſtopped the paroxyſm at its commencement, by two grains of opium diſſolved in vinegar with æther. He enjoyed a good night, and aroſe in the morning without dyſpnœa or expectoration.

He was now prompted to ſee the event of a journey into Warwickſhire, but here the paroxyſm came as uſual on the evening of his arrival, when his mind was occupied with the ideas of diſtreſs which he had before experienced in the ſame place, and which he had great anxiety to avoid. When he perceived the ſymptoms, he withdrew from company, and took a draught of cold water and vinegar with forty drops of tinct. opii. Relief ſoon came, but it was not extended to a perfect removal of the affection, which he attributed to the ſtrength of habit.

The doſe of opium was repeated, and he had a good night, but no ſleep: in the morning ſome dyſpnœa remained, but without wheezing. Further reflection ſtrengthened his opinion that he was now under the dominion of a ſecondary diſeaſe eſtabliſhed by habit, and he determined to anſwer the *new indications* by any effort which circumſtances might demand. He recollected the aphoriſm of Hippocrates on the convulſive diſeaſe of epilepſy, and the doctrines of ſome modern writers on the powerful influence of cuſtom or habit in the animal œconomy.

Military buſineſs appeared to be moſt oppoſite to his former purſuits, and therefore moſt likely to break the aſſociation of his ideas, to diſſever the links by which they revived old ſenſations, or to obliterate their influence. Exerciſe near the ſea, where the denſity of the air might co-operate with other means of cure, and the opportunity of bending his mind to the principles of a new ſcience, were his motives for taking a company in a regiment of militia, commanded by excellent officers, who were his friends.

At the end of June he joined this regiment, then encamped upon a dry common, elevated above the plain, and ſloping towards the ſea, which was at a few miles diſtance. The Colonel permitted him to occupy lodgings, with his family, in the vicinity of the camp. He at firſt avoided, with great care, errors in diet, which are exciting cauſes frequently met with at military tables. But after a few weeks he found that preciſe caution was unneceſſary, an accidental error having no bad conſequence. He ſoon gave his whole attention to the ſcene before him, and attempted to fill his mind with the images which it preſented. A new ſyſtem of tactics being ordered for practice of the regiments in camp, he employed himſelf in the ſtudy of its principles, and their application to active ſervice.

In this purſuit during the ſummer, and till late in the autumn, he had uninterrupted health. He again felt the vigorous ſpring of youth, and experienced that ſatisfaction of mind which the capricious tyranny of his diſorder had denied him for the preceding ten years. He generally aroſe at four in the morning, and often marched ſix miles in the duſt of two brigades of infantry, to be reviewed in the heat of the day. It was noon before he returned to the camp, but neither cough nor dyſpnœa was excited. Dyſpepſia was entirely overcome: liberties were taken with every ſpecies of diet, and no exertion ſeemed too conſiderable, as fatigue was never felt. Towards the cloſe of the campaign the ſeaſon being very inclement, the tents were wet with rain for ſeveral weeks, but he ſuffered no alteration for the worſe, though now conſtantly ſleeping in the camp.

1795.—The regiment was cantoned in the towns of Cambridgeſhire during the winter, and he had no return of Aſthma.

In March he had orders to take three companies under his command, and to follow other diviſions of the regiment to Hull. He was now ſo confirmed in health, as to determine upon finiſhing his military experiment, when this duty was diſcharged.

But at Huntingdon, having taken cold, and drunk bad wine, he had ſymptoms of his diſeaſe; their progreſs was, however, ſuſpended by opium, and finally carried off in a bilious diarrhæa.

At the end of the month, fully ſatisfied with the ſucceſs of an uncommon experiment, he reſumed his regular profeſſion, and to the preſent period, in June, 1800, has felt no ſymptom of his former complaint.

He therefore believes himſelf to be cured of Aſthma, as the interval of ſix years has elapſed ſince he had a paroxyſm; but this concluſion is ſtrengthened by other conſiderations. He is no longer troubled with indigeſtion, nor affected by the numerous exciting cauſes which prevail in Birmingham, where the air is much rarified, and the population very great, with particles of duſt continually floating in the atmoſphere. To ſecure himſelf more effectually againſt a return, he however, purſued the means of prevention during the two firſt years of his reſidence, ſince which period he has taken no particular care, except by cold bathing in the ſummer, which he means to continue.

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MUCH more may be ſaid upon Diſordered Reſpiration, but affections of the lungs, attended with fever, are not to be conſidered upon the principles of this Inquiry. Theſe cannot be eſteemed caſes of Convulſive Aſthma; and Continued Aſthma has been ſufficiently noticed.

The Inquiry has ſhewn ſome ſpecific cauſes of Convulſive Aſthma, not before properly attended to. If theſe afford the indications which are pointed out, it may be expected that the practice will correſpond with them. According to my experience, the directions here given, will furniſh the practitioner with the beſt means of alleviating the paroxyſm and curing the diſeaſe.

There are, however, contra-indications, and converſions of ſymptoms in all diſeaſes, which demand, occaſionally, clinical attention; and in this diſeaſe, as well as others, no written rules will then ſupply the want of medical obſervation and experience. The general lines which are laid down may guide the ſtudent in his further inquiry, and probably aſſiſt the judgment of thoſe who have not determined to limit their views to the diſtinction of Humoral and Convulſive Aſthma.

APPENDIX.

APPENDIX.

SINCE the firſt Edition of this Inquiry was publiſhed, I have had further experience of the advantage of following the directions contained in it; at the ſame time, the reaſoning and concluſions are more confirmed by additional obſervation.

It may be convenient to recapitulate the principal facts and inferences on which I have endeavoured to eſtabliſh the diſtinction of Four Species of Convulſive Aſthma—I ſhall then ſubmit a few caſes and practical remarks:

In Sect. I. The nature of *Convulſive Motions* is ſtated. Theſe are ſhewn to be *re-actions* of muſcles for the purpoſe of removing injury or irritation.

The popular term, *Difficulty of Breathing*, is then proved to conſiſt chiefly in ſuch *re-actions* of the reſpiratory muſcles, and not merely in cauſes of oppoſition to the free inſpiration of air.

The re-actions of the abdominal and the thoracic muſcles are commonly aſſociated. A perception of irritation in the rectum or bladder is followed by moderate re-action, as a natural effect. A ſimilar perception in the lungs, though not from common cauſes, is followed by ſtronger re-action, for the purpoſe of relieving them. And in all caſes of irritation in the viſcera of the thorax and abdomen, the ſame muſcles are the inſtruments of relief.

Sect. II. Having eſtabliſhed the fact, that convulſion is a re-action of muſcles, cauſed by injury or irritation, we are led to conſider the *irritations* which produce the Convulſions of Aſthma. Some of theſe had been noticed as *manifeſt* cauſes of *Continued Aſthma*, in which the ſame external effects appear as diſtinguiſh *Periodic Aſthma*.

The ſtep from *manifeſt effects* to *manifeſt cauſes* being eaſy, and their connection not likely to be diſputed, the evidence of theſe cauſes of Continued Aſthma appeared to be a true and proper baſis for the following propoſition, viz.

" *The exceſſive contractions of the muſcles of reſpi-*
" *ration indicate an injury, or irritation in ſome organ*
" *which thoſe muſcles ſerve.*"

In Sect. IV, We arrive at *Convulſive Aſthma*; ſo called by general conſent. Here the external re-action is a manifeſt *effect*, as in the Continued Aſthma; but the *cauſe* is frequently not manifeſt without inveſtigation of facts and analogies. The Periodic and Continued Aſthma only differ as the re-actions more or leſs remit: and as ſimilar effects proceed from ſimilar cauſes, we are diſpoſed, *a priori*, to attribute ſuch re-actions to irritations, however obſcure. Theſe are inveſtigated by tracing them from their effects, and from the appearances which they occaſion in the diſordered ſyſtem.

Sect. V. In the *Firſt Species*, the appearance of mucus is a leading feature. All, except modern writers, conſidered this material, or one equally manifeſt, as the cauſe. It is ſhewn, that no ſuch diſeaſe as Convulſive Aſthma, without a manifeſt cauſe, was noticed from the earlieſt records of medicine, till the time of Cullen; who, however, denied to the majority of caſes, the exiſtence of ſuch a cauſe. To determine an important queſtion, whether a material or manifeſt cauſe exiſt or not in this diſeaſe, the evidence of diſſection is next examined.

Sect. VI. In many caſes an exceſſive collection of lymph was found in the air veſſels after death. But the moſt convincing proof of ſuch a cauſe is taken from living ſubjects. A violent affection was diſcriminated by Doctors Darwin and Beddoes, as a caſe of Convulſive Aſthma, in which "large quantities of the frothy ſerum were "thrown off," and the patient recovered from her inſenſibility. The deſcription of Aſthma by Cælius Aurelianus, correſponding with the ſtate of this patient, corroborated their opinion of the nature of the diſeaſe.

An objection may be made to the poſſibility of an animal being preſerved with ſuch an effuſion of fluid in the lungs; but this is obviated by the experiments of Dr. Goodwin and the Author, who found, that, by avoiding the paſſage through the larynx, the oppreſſion could be borne without inſtant death; and, finally, be overcome by abſorption.

Sect. VII. It is next inquired, what ſtate of the lungs permitted the paſſage of ſo much lymph. The explanation depends on the preceding facts and inferences. The capillary veſſels, greatly weakened by remote cauſes, let the ſerum paſs; the effect of which is difficulty of breathing, or re-action of muſcles, to remove the inconvenience.

The remaining diagnoſtics are then conſidered, and referred to the ſame cauſe as *Difficulty of Breathing*. The veſicles not being able to collapſe, there is, at firſt, *little or no Cough*; but, in proportion as the fluid is leſſened by abſorption, the cough increaſes, attended with *Spitting*; and the "obſtacles to a free and full inſpiration, preventing "alſo a free and full expiration," are accounted for by viſible ſigns. *Wheezing* and *Straitneſs* are occaſioned by the obſtruction of lymph, and by the ſtate of the ſtomach and œſophagus, which was a remote cauſe preceding the difficulty of breathing in the fit.

Sect. IX. Other ſymptoms are detailed, which frequently, but not conſtantly, attend this ſpecies of Aſthma. None of theſe is inconſiſtent with the cauſe aſſigned; and the moſt remarkable of them can only be accounted for by its exiſtence.

Sect. X. The *prediſpoſing cauſes* are naturally connected with this proximate cauſe of effuſed lymph. *Dyſpepſia* and *Irritability* are the moſt important of all. The muſcular re-action takes place ſooner or later, as the prediſpoſing Irritability is greater or leſs in the aſthmatic ſubject.

Sect. XI. The *exciting Cauſes* are detailed; each of which may ſuddenly bring on the paroxyſm: they are therefore all objects of practical attention.

Sect. XII. The *Second Species*, uſually called the Dry Aſthma, is traced to *Aerial Acrimony* in the lungs. As the fits were very capricious, and the cauſe obſcure, a concluſion was drawn, and readily aſſented to, that a ſpaſm of the bronchia occaſioned this diſeaſe: but in reaſoning upon it, a previous induction, from conſpicuous facts, was much wanted. If a diſtinct conception of the external re-actions had been attained, and the laws of animal life which govern them had been juſtly applied, irritating cauſes would have been clearly ſeen in many caſes. And after this eſſential ſtep, analogy, and the ſame laws, would have been ſafe guides in inquiring after the cauſes of others.

It is ſhewn that *ſubtle matter* may be conveyed inſenſibly to the branches of the trachea, and ſuddenly occaſion muſcular re-action in the ſame manner, as a cauſe of ſenſible bulk.

Irritations ſeated in the lungs having been thus ſhewn to occaſion two ſpecies of the diſeaſe, the propoſition in Sect. II. p. 14, is ſo far ſupported by both.

Sect. XIII. In the *Third Species* there is a new object of inquiry. Diſeaſes of the Abdominal Viſcera had been obſerved in caſes of Aſthma; but they had not been conſidered as proximate cauſes; nor could they be ſo conſidered till the muſcular re-actions were better underſtood. In theſe conſiſts the paroxyſm, which may take place for the purpoſe of removing injury from the abdominal, as well as from the thoracic viſcera: —all the acting muſcles being common inſtruments of relief to theſe viſcera.

Acrimony in the ſtomach or bowels, very probably, cauſes re-action in many caſes, and merits great attention. Thus Aſthma may be ſaid to begin in ſome very irritable habits, at a period, which, in others leſs irritable, is that of prediſpoſition only.

A concluſion is drawn from theſe premiſes, that Aſthma is cauſed by "*Irritation in ſome* "*of the Abdominal Viſcera, but particularly in* "*the Stomach,*" ſtill further confirming the propoſition.

Sect. XIV. The *Fourth Species* is that diſeaſe which, having been originally cauſed by the irritations above-mentioned, retains its form of muſcular re-action from habit. *Habit* may be a prediſpoſition, acted upon by *ſenſations* that are revived by *ideas* of the mind. In this view, ſenſations are the proximate, and ideas the exciting cauſes: and inſtances are given of their power, both in the ordinary actions, and in the diſeaſes of the animal œconomy.

Thus Convulſive Aſthma is divided into Four Species, each of which is diſtinguiſhed by the property and ſituation of its irritating cauſe; and all are governed by the fixed laws of animal life.

Part II. Medical treatment ſhould be applied to the prediſpoſition, for, unleſs this be effectually removed, the diſorder will return. The ſucceſsful agents are tonics, employed with long and patient perſeverance in the majority of caſes. To theſe muſt be added ſuch others as leſſen morbid irritability in all: and in the Fourth Species, the means of changing ideas of the mind, and conquering their influence on the ſenſations of the body.

On the Diſtinction of the Species.

I Deem it of no great importance, that a diſtinction between the *Firſt** and the *Third*† *Species*, cannot be convincingly proved in all caſes.

Where dyſpepſia occaſions the re-action of the reſpiratory muſcles, it may be ſaid, that the Third

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* See Sect. IV. VII. IX.

† See Sect. XIII.

Species of Aſthma is formed before the patient had been reduced to the ſtate cauſing the Firſt; and this conformably to the laws which regulate all the reſpiratory motions.

The Firſt Species may therefore include two cauſes, each equal to the viſible effect; but as the proportions of irritability vary in different ſubjects, muſcular re-action is ſooner excited in one than in another.

We may be guided frequently to a diſtinction by conſidering, that, in the Third Species, the ſubject is likely to be younger, and to have more bodily vigour. He is probably attacked after dinner, or a meal of indigeſtible food, or after drinking flatulent liquor; but the ſubject of the Firſt Species is generally ſeized in the night, after having ſlept.

Mucus is diſcharged in both by coughing. In the Third, it may be owing to an obſtruction in ſome of the Abdominal Viſcera, or to the diſtention of the firſt paſſages, from dyſpepſia, as, if either of theſe ſtates exiſt, there may be a difficult tranſmiſſion of blood through the lungs; and lymph may be forced out of the veſſels, occaſioning expectoration, as well as diabetic urine.* But here the quantity of mucus will be much leſs;

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* See p. 116. 120. 167.

and it muſt be conſidered as an effect of the condition that cauſes the re-action, and not the cauſe itſelf, as in the Firſt Species.

Beſides the ſtomach, the other viſcera of the abdomen may be found to be diſeaſed. We muſt not haſtily conclude, that the affection of the liver, of a kidney, of the uterus, or of the bladder, is a remote cauſe merely, or an effect of Aſthma; or that it is incurable. We are certain that the re-action of the reſpiratory muſcles may be cauſed by an irritation in any of thoſe organs, and we muſt endeavour to remove it: but a diſeaſe of one of them will not create ſo much difficulty in the diſtinction as that of the ſtomach, though it may be longer before it be noticed, and the treatment be neceſſarily different, as employing deobſtruents and diuretics, mercurial doſes, with gentle aperients, and cautiouſly avoiding iron and tonics, till the obſtructed organ has been perfectly relieved.

On the contrary, when dyſpepſia appears diveſted of theſe cauſes in the lower viſcera, there can be no practical inconvenience, ſince both the ſtomach and lungs muſt be cured of their weakneſs before the Aſthma can be cured. The object of ſuſpending or ſhortening the paroxyſm being of little importance, in compariſon with that of ſecurity againſt its return, which can only be attained by the ſame general means in either ſpecies.

Of the *Second Species*,* it has been remarked, that an irritation in the trachea, naturally brings on an increaſed ſecretion of lymph to defend the membrane: but an obſerving practitioner can be at no loſs to diſtinguiſh ſuch an effect from the more copious ſpitting of the Firſt Species, in which alſo, the habit of expectoration frequently appears between the paroxyſms. It may be diſtinguiſhed from the Third, by the capricious manner of the attack; from dyſpepſia not having preceded, though it occaſionally may attend the paroxyſm; and from the fit going off without an apparently critical diſcharge. The uneaſineſs at the præcordia, called Anxiety, is in no greater degree than dyſpepſia; and wheezing does not occur till the violence of muſcular of re-action is paſt. Strict inquiry may ſhew, that a particular place, or a certain point of the wind, produces a fit; when, if a change of reſidence brings relief, the nature of the diſeaſe will be ſufficiently manifeſt.

It may be diſtinguiſhed from the Fourth by its firſt form being preſerved; whereas, the Fourth is rather a ſequel, diveſted, in great meaſure, of its original ſigns of material irritation, as Spitting, Wheezing, and Dyſpepſia.

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* See Sect. XII.

The *Fourth Species** may be conſidered as eſtabliſhed, when general ſtrength of body is acquired, with improved digeſtion; when expectoration is much diminiſhed, and dyſpnœa and wheezing gone, the diſeaſe retaining only its original convulſive reſpiration: it generally ſucceeds the Firſt and Third Species after a diligent employment of the means of cure, but in appearance, it is more allied to the Second than to any other, though attention to the previous ſtate of the patient will give a certain diſtinction between them. To be more aſſured of the diſeaſe in theſe circumſtances, he may be tried with antiſpaſmodics; and if the paroxyſm be ſuſpended by a doſe of opium or æther, I confidently believe that he may obtain a cure by ſteady obedience to direction.

On the Succeſſive Appearances of the Symptoms.

OF the ſymptoms which are ſaid to conſtitute Spaſmodic Aſthma, the eſſential one is the *Difficulty of Breathing*; by which, in definite terms, we muſt underſtand, the convulſive re-action of the reſpiratory muſcles. This belongs to all the Species; and it is more in compliance with eſtabliſhed method than the natural fact, that the other ſymptoms have been conſidered as diagnoſtic.

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* See Sect. XIV.

In conſequence of this view of the ſubject, the definition was framed in terms which may poſſibly be objected to: but in confirmation of it, I have obſerved the ſymptoms to appear individually in ſucceſſion, at greater or leſs intervals; and the violent re-action of the muſcles to crown the whole in the following order:—Firſt, the *Wheezing* was perceived: after an interval of many months, *Anxiety* and *Straitneſs* of the præcordia ſucceeded: then the ſhort and interrupted *Cough* came by fits in the morning, or after meals. *Dyſpnœa* then appeared, and gave, in ſome caſes, a more certain prognoſtic of Periodic Aſthma; but often the Convulſions made a ſudden attack without this intervening ſtate.

The other ſymptoms may therefore appear, collectedly or individually, without the convulſive re-action; but unleſs this be added to them, a paroxyſm of Aſthma cannot exiſt. They denote a pre-diſpoſing ſtate of the thoracic or Abdominal Viſcera, which the re-action is intended to remove.

This progreſs may be ſeen moſt diſtinctly in ſubjects, who, from being leſs irritable than others, are not ſo ſoon ſeized with a paroxyſm. But there muſt be better opportunities than are uſually allowed to the phyſician, who is ſeldom called for till the attack has taken place. Still, by examining into previous complaints, as well as the preſent, with ſome actual obſervation, he may obtain his object of inquiry.

The following caſes exemplify this gradation of ſymptoms.

Case.—Mr. T———n is about 50 years of age. Two years ago, when he was in bed, he firſt perceived a Wheezing in his reſpiration, which has returned almoſt every night ſince without any difficulty of breathing. It was like blowing through a reed, and gradually became worſe. Laſt winter he had a Cough and Spitting for the firſt time, and ſome ſtraitneſs under his ſternum, but no fit of the Aſthma. In the day he is free from wheezing, and has no dyſpnœa. When I firſt ſaw him in the laſt winter, I found that he was ſubject to indigeſtion and head-ache, which generally came after meals. His pulſe was regular, but preſſure on the pit of the ſtomach gave him uneaſineſs. His urine was high-coloured, and his feces were pale. I conſidered him as pre-diſpoſed to Aſthma by a turgid ſtate of the liver, and weakneſs of the ſtomach. Theſe organs would preſs the diaphragm when the patient lay down, and the trachea would be narrowed.

I preſcribed mercurial pills and ſaline diuretics, with abſorbents, which took off the uneaſineſs at the ſtomach, and leſſened the Wheezing, but did not cure it. He has ſtill ſymptoms of indigeſtion; and I have preſcribed tonics which I hope may prevent a paroxyſm of Aſthma in the enſuing winter. The Wheezing had made him call it an Aſthma in the laſt winter, from his obſervation of that diſeaſe in others; but if he had been ſeized with the fit, he would have felt a painful diſtinction.

Case. — Mr. Herman, of Hamburgh, had been affected with Wheezing for three years, and a ſtraitneſs at the præcordia, with occaſional Coughs for one year, before he was ſeized with a fit of the Convulſive Aſthma. He had general good health till he was upwards of 40 years old; and the wheezing came in conſequence of travelling in wet cloaths in Weſtphalia. It was always confined to the night, and grew worſe after ſome hours of reſt. In the winter of 1798, he had a paroxyſm for the firſt time. The aſtoniſhment he expreſſed at the ſeizure, ſufficiently ſhewed, that he had been previouſly unacquainted with this violent re-action of the muſcles. It occurred after he had long made uſe of antimonial diaphoretics, and tepid bathing, which were adviſed by a German phyſician, probably, in conſideration of the remote cauſe of his complaint.

In the ſpring of laſt year, when he had had three paroxyſms, I was conſulted by letter. I recommended iron ruſt, and bitter infuſion, twice every morning: warm cloathing, and the fleſh-bruſh; a continuance of the tepid Bath every other day, but with the caution of lowering the temperature gradually, till it was reduced to 60 degrees of Fahrenheit, at which he was to continue its uſe. He was enjoined to keep his ſtomach free from indigeſtion, and to uſe regular exerciſe. I have received favourable accounts in ſeveral letters ſince this plan was commenced:—he had no paroxyſm in the ſummer-months of laſt year, but he had a ſlight one in November, after expoſure to great cold. His complaints were, after that, confined to Wheezing, and occaſional Cough. He ſtill purſued his plan; and theſe remains of diſeaſe were entirely overcome in January laſt.

I was aſſured in a letter, dated May 10th, that, he was perfectly free from every ſymptom, was robuſt in his body, and capable of any exertion.

The firſt of theſe caſes only offers negative evidence; but it is ſo ſtrengthened by the laſt, that the mind is as well convinced of the tendency to Aſthma in the one, as of the actual exiſtence of the diſeaſe in the other.

If it be ſaid then, that the encreaſed exertions of the muſcles are *motus medicati* to remove a diſeaſe, and not the diſeaſe itſelf, we may anſwer, that though nature employs the re-actions for her ſafety, it does not follow, that the injury previouſly felt was Aſthma; or that the re-actions do not become morbid by exceſs. The convulſive actions in ileus, may be *motus medicati*; but they counteract their purpoſe by their violence. The re-actions in Aſthma are ſo far morbid, as to exiſt by habit, after the cauſe has been removed, as in the Fourth Species. And they are ſo eſſential to the character of Aſthma, that if all the other ſymptoms exiſted, they would not be acknowledged as Aſthma, whilſt they were abſent.

Remarks on the Treatment.

THE confidence which I had placed on tonics in the cure of Aſthma is not leſſened by the circumſtance of having ſeen their action reſiſted, in ſome caſes, apparently favourable to their exhibition. In all theſe the patients failed in requiſite perſeverance, or they counteracted the effect of medicines by irregular modes of living.

How important it is to attend to regimen, appears from dyſpepſia making a part of the prediſpoſing ſtate in the Firſt Species, and from its being a proximate cauſe in the Third, if the habit were not paſſive under the ſingle irritation of the ſtomach.

Many caſes of the Third Species may be the conſequence of exceſs, and in theſe indulgence is an enemy always in arms, to which rules can only be oppoſed at intervals: we are not to wonder then, if medicine, in ſuch inſtances, be uſeleſs, and even the inſtrument of its own diſcredit.

The following example ſhews the difficulty of conquering inveterate habits, and the uncertainty of reckoning on a cure from the ſteadineſs of the patient:

Case.—A young man had ſuffered Spaſmodic Aſthma eight years. He had been a very free liver, and had drunk malt liquor in large quantities. His firſt complaints were in the ſtomach, which had been long diſordered with wind and uneaſineſs before he had a fit. He has now almoſt conſtantly the heart-burn; and when this has been worſe than uſual, a fit ſtill follows with great certainty. He is of a ſtrong make: his pulſe is regular, and he coughs and ſpits but little.

June 19, 1799, I preſcribed pills of rubigo ferri, rhubarb, and pepper, to be taken night and morning, with elixir vitrioli in a glaſs of water. I alſo ordered pulv. teſt. oſtreorum, and magneſia uſta, to be taken in peppermint-water at dinner-time. He was reſtrained from malt liquor, but allowed a ſmall portion of ſpirit in his water.

After having ſeen this patient once only, I was ignorant of his ſtate till the month of May, 1800, when Mr. Coley, of Bridgenorth, in whoſe judgment, and accurate obſervation, I have very great confidence, favoured me with the following account: "He is very unwilling to allow that he "received benefit from the medicines and regi"men which you preſcribed, except that they "cured him of the Cardialgia; but as this evi"dently preceded, or accompanied every Aſth"matic attack, and as he was actually during "the laſt three weeks of ſix, in which he took "the medicines *entirely free* from any diſeaſe of "reſpiration, and continued ſo with very little "occaſional diſturbance for as much as two "months after this, I have myſelf very little "doubt, but if he had perſevered in the *regimen*, "and only occaſionally had recourſe to the me"dicines, they would have effected a radical "cure."

He then adds ſome particulars, which ſhew the intemperate conduct of the patient, and its influence, in bringing on the paroxyſm. "He has "now a fit upon him, which has continued with "very little intermiſſion for three days, and was "certainly brought on from the over-night's boun"tiful ingurgitation; and, probably, inebriation "with ſpirit and water."

An inference may be drawn from ſuch practices, that where it has been judged neceſſary to forbid the uſe of malt liquor, the latitude which is granted of adding ſpirit to pure water, is likely ſoon to be abuſed, and at laſt to become as great a bane to the patient as the more glutinous beverage. I know of no ſecure medium but that of directing the number of ounces of ſpirit to be mixed with proportions of water in a certain number of hours; and the quantity ſhould be progreſſively diminiſhed, till pure water, the beſt of friends to digeſtion, when the ſtomach is in its natural ſtate, be uſed alone.

The practice recommended by former doctrines, or experience, has very ſeldom produced an effectual cure of Convulſive Aſthma.

Of the Four Species, the Second is the only form that has been overcome, by plan or accident, within my obſervation: — in the inſtances of this diſeaſe having diſappeared, the patient's reſidence was changed from the town to the country; and the only medicine found to be beneficial, was opium. Cures have been ſpoken of in the other Species, but it would have been prudent to have deferred ſuch concluſions till they could have been ſupported by longer intermiſſions.

I attribute the general want of ſucceſs to the almoſt entire neglect of the intermiſſions. This may be partly owing to the limited views of the diſeaſe hitherto taken by practitioners, and partly to the circumſtance of Aſthmatics permiting attendance only in the paroxyſm. An Antiſpaſmodic that had been once uſeful, is conſidered as the only friend, without reflecting on the improbability of any good reſulting from its exhibition, unleſs the firſt paſſages had been previouſly cleared of acrimony in the Third Species, or the lungs relieved of obſtructing lymph in the Firſt. To ſhew this, we will ſuppoſe a patient to be ſeized with a paroxyſm after having eaten roaſted gooſe, paſtry, turtle-ſoup, bacon, or raw vegetables, which I have known to bring it on. I ſhould think that the muſcular re-actions were cauſed by theſe materials; having ſeen the fit, in ſome inſtances, at its height, before the indigeſtible matters could have got out of the ſtomach; and in many more when they had not paſſed the bowels. In all caſes, great inflation and acidity muſt add to the irritation. A conſiderate man would not direct a doſe of opium at the firſt attack before the acrimony had been diſcharged, though afterwards it may be very uſeful.

In the Firſt Species the lungs may be gorged with lymph, as frequently happens to Aſthmatics who have taken cold. Here the exhibition of opium cannot be reckoned generally ſafe, till expectoration is free, when it may abate the reaction, which often continues ſtrong after the bulk of the fluid has been removed.

In the ſame intention as opium, ardent ſpirit may be uſeful. In the Third Species it has been taken during the ſtate of indigeſtion, and with advantage. It may excite the feeble ſtomach to contract, and thus remove one obſtacle to free reſpiration, in caſes where opium would not anſwer: but diluting the contents of the ſtomach with repeated draughts of cold water, has a far better effect, and is a more innocent cuſtom.

But the practice ſhould not be confined to theſe limits. If iron and bitters, with the means before recommended, be uſed in the intermiſſions, the paroxyſms will not only be more diſtant, but the ſtomach and lungs will contain leſs of the cauſes of irritation.

After the firſt delay of the paroxyſm, it generally happens, that the next return is more violent; a circumſtance that the patient ſhould be prepared for. We may hence infer, that the muſcles are ſtrengthened, and capable of more action. The convulſions of an hyſterical female are generally vigorous, in proportion as ſhe is athletic: and the force of a paroxyſm of Aſthma may be eſtimated by the ſame rule. There is alſo a proof that ſome progreſs is made in the cure; for, as the intermiſſions encreaſe in length, we approach nearer to the object in view. Antiſpaſmodics may be then uſed with greater freedom, and tonics with leſs. For theſe reaſons, which I think very important, as they regard the practice, I may have inſiſted more on a material cauſe, than to others may appear neceſſary: and I have endeavoured to diveſt the theory of every inviſible movement, not becauſe a ſpaſmodic conſtriction of the bronchia is impoſſible, but becauſe it took up ſo much attention in general practice as to exclude more certain means pointed out by real indications.

Caſes and Remarks.

I SELECT the following Caſes farther to elucidate the above diſtinctions, and to ſhew their influence upon the practice. I think they prove, that the outline of our Inquiry is capable of improvement; and that, however imperfect it may be at preſent, it offers an important object of conſideration to the Practitioner.

CASE I.

Mr. M—— had been a free liver, and particularly attached to women. He ſuffered ſeverely in conſequence; and before he was 35 years old, had been much uſed to bougies.

A few years afterwards he had ſuch irritation in his bladder, as occaſioned the ſuſpicion of a ſtone, but none was found by ſounding. Diſcharges of purulent mucus appeared in his urine, and he was troubled with teneſmus. At 44 years of age, it was determined that the proſtate gland was diſeaſed; but it was ſtill uncertain if there was a ſtone in the bladder. He began to cough more than uſual, and to be affected with diarrhœa at times. He had no expectoration, and little or no encreaſed quickneſs of pulſe. This was nearly his general ſtate, when, after much irritation in his bowels with liquid ſtools, a fit of the Convulſive Aſthma ſeized him, which laſted two or three days, with morning remiſſions.

In February, 1798, he was well acquainted with theſe attacks, and aſſured me, by letter, that they had always been preceded by particular irritation in the lower bowels and bladder. Sometimes blood appeared in the urine, but generally there was purulent matter, mixed with dark-coloured particles, but no concretions of gravel. His urine was of a bad ſmell.

I ſaw him in May, 1798, for the firſt time; and have ſeen him frequently ſince. His paroxyſms are purely convulſions of the external muſcles, unattended by ſtraitneſs, anxiety, or wheezing; a cough often, but not always occurs; and he ſpits very little at the termination of the fit. I was ſo ſatisfied of the cauſe of this diſeaſe, that I made no attempt to cure the Aſthma but by moderating the irritation in the bladder. I preſcribed uva urſi, and pills of opium; and ſtarch glyſters, with tinct. opii. Theſe means have greatly abated the Convulſive Aſthma, but not cured it.

CASE II.

Mr. R. is 32 years of age, and has had calculous complaints as long as he can remember. When he was 16 years old, a ſtone was taken from his bladder. This ſtone appears to have adhered to a concretion that could not be extracted, and nephritic ſymptoms have been habitual to him ever ſince. He was ſeized with a paroxyſm of Convulſive Aſthma thirteen years ago, and it has returned very frequently ſince. He has attended particularly, from my ſuggeſtion, to the connection of Aſthma with the fit of the ſtone; and ſays, he believes the latter, conſtantly brought on the former, or accompanied it: and this, he thinks, muſt have long been the caſe, though the irritation of the ſtone being more habitual, his obſervation has been formerly leſs accurate. He is certain of a particular fact of long ſtanding:—his water was always deep red, or coffee-coloured preceding a paroxyſm.

This young man poſſeſſed unſubdued vivacity and courage; and great activity in the buſineſs of wire-drawing for many years. His diſeaſes are now tending to phthiſis. He has had ſpittings of blood in the laſt year, and expectorates pus at intervals, which give relief for a time. Digitalis, and opium, have been uſeful. The calculous complaints ſtill keep him in conſtant torment, with ſome abatement from opium and ſoda. Since the hæmoptoe and hectic began, he has had no diſtinctly periodic fits of Aſthma, but his habit ſeems generally diſeaſed.

The obſtructed ſtate of the urinary paſſages, and of the veſſels connected with them, has probably induced the pulmonary diſeaſe; but the muſcular re-actions took place long before this complication.

The two preceding Caſes are aſſigned to the Third Species of Convulſive Aſthma; and it appears probable, that the re-action is frequently occaſioned by diſeaſes of the kidneys and urinary paſſages.

I have ſeen ſeveral Aſthmatics who were much harraſſed with nephritic complaints; and ſtones have been found in the bladder or kidneys of others. Theſe caſes ſeemed only to admit of occaſional relief. Mr. R. had uſed alcaline aerated water for a conſiderable length of time; and afterwards ſoda, with opium.

The caſe of Mr. M. is not leſs hopeleſs in any intention of cure; but I have ſeen opiates give him relief; and theſe are the only means he now applies to.

CASE III.

Mrs. T. aged 49, had been ſeveral years ſubject to Dyſpnœa in the winter. Since the menſes ceaſed two years ago, ſhe has been conſiderably worſe. Paroxyſms of Convulſive Aſthma have been frequent, and violent, preventing her lying down in the night. She wheezes, her bowels are coſtive, and ſhe has frequently the piles. She expectorates in a morning, but not freely.

March 19, 1799, I directed an expectorant mixture of ammoniac & acetum ſcillæ, but it ſeemed to increaſe the diſpoſition to cough, without promoting ſpitting.

March 27, I preſcribed gentle aperients with aſafetida, camphor and opium, but with no ſucceſs in moderating the paroxyſm.

April 5, after having conſidered her habit, and period of life, I applied to ſaline medicines, with tinct. opii. and bleeding. Theſe means were moſt uſeful, but ſhe ſtill ſuffers returns of the paroxyſm, though more diſtant, and comparatively mild.

CASE IV.

Mrs. P. aged 52, a delicate woman, but previouſly ſtrong and muſcular, had been affected with an Aſthma for ſome time paſt. The menſes became ſparing when ſhe was 45 years old: and after they had ceaſed for eight months, they returned, and have been profuſe about once in three months, for the laſt two years. In every inſtance the diſcharge was preceded by a paroxyſm of Aſthma. Between the fits ſhe is diſpoſed to hyſterical ſymptoms, and has great pains in the back and loins. Her pulſe is full and ſtrong before the paroxyſm, which ſhe knows when to expect, as it has lately attacked her every ſix weeks with conſiderable regularity.

I adviſed a quiet life, ſaline medicines, with tinct. opii. and veneſection once in two months. Soon after ſhe ſtood in the ſhower bath every other day. The plan was manifeſtly uſeful, and in ſix months the menſes ceaſed to appear, though ſhe had a ſlight paroxyſm in that time; but nine months have elapſed ſince without one, and ſhe has a ſhew of menſes, at long intervals, without inconvenience.

The caſes of theſe two females appeared to be much influenced by their reſpective periods of life. The Convulſive Aſthma of Mrs. P. ſeemed to be entirely cauſed by the ſtate of the uterus, as a diſcharge from the uterine veſſels terminated every paroxyſm; and ſhe had not experienced Aſthma till the change of life had commenced. The treatment was agreeable to well-known rules applied to her circumſtances, and the Aſthma went off as the conſtitution ſettled. I am aware, that it may be ſaid, the turgeſcence was in the lungs, which the uterine diſcharge relieved; but there were always great pains in the loins and neighbouring parts preceding the paroxyſm; and ſhe had no cough, wheezing, or ſtraitneſs.

If Mrs. T. be cured of Aſthma, it muſt be when her conſtitution has paſſed the change, and a better calculation can be made of the probable effect of medicine.

CASE V.

Mrs. D. is about 30 years of age, of a brown complexion, and a thin, irritable habit, with a diſpoſition to accumulations of bile, followed by ſickneſs or diarrhæa, or both. She had a Catarrhal Cough in the winter, without a paroxyſm. This was nearly gone, when ſhe was ſeized to her ſurprize with an acute fit of Aſthma, after eating paſtry, and other improper things, which, from the ſtate of her ſtomach, had been forbidden. She complained of a pain at the ſternum, and below the enſiform cartilage. Her bowels had been very irregular; her eyes were yellow, and her urine high-coloured; and, at the time of my viſit, ſhe had been coſtive two days.

March 30, ſhe had great dyſpnœa in the day. The preceding night ſhe had had no ſleep, and it was the ſecond paroxyſm that ſhe had ſuffered. I preſcribed, with the intention of bringing on nauſea, or purging, which had, before her preſent attack, been natural means of relief.

R Pulv. Scillæ ſiccatæ.—Ipecacohanæ āā ℈i
Calomel ppt. gr. v. Saponis albi ℈ſs Mucilag. q. s.
ft. Pilulæ 20—capiat duas ter in die.

Theſe pills provoked a nauſea only. I therefore ordered Ol. Ricini, to open the bowels more completely. Believing there was congeſtion in the liver, I thought it uſeleſs to give antiſpaſmodics till it was removed, and the diſcharges were free. In two days ſhe was greatly relieved of uneaſineſs at the ſtomach, having had ſtools freely.

April 5. I found ſhe had had a moſt violent and diſtreſſing fit the evening before, which had continued all the night, and cauſed great alarm to herſelf and friends. I queſtioned her narrowly, and found that her ſtools had been clayey the preceding day, and that ſhe had had great oppreſſion at the ſtomach after dinner, having imprudently eaten of ſat roaſt beef. I preſcribed an emetic, and a ſaline mixture, with a pill of calomel to be taken when the emetic had operated. The next day ſhe had high-coloured bilious ſtools, with relief. Her cough, which previous to the Aſthma had been ſo vexing, now gave her little trouble, which evinced that the cauſe was not in her lungs. She, however, wheezed in the fits; and her pulſe became quick every evening. Every day I promoted a diſcharge from the bowels: and after three days ſhe loſt the paroxyſm under means which would have prolonged it in the Firſt Species. Opiates did not ſuit her; and bitter infuſions ſeemed ineffectual, without free diſcharges. She is now in the habit of taking pills of Pilul. aloes cum myrrha, with ammoniac and ſoap, and remains well.

I do not, however, expect, that ſhe will continue to be free from Convulſive Aſthma, becauſe ſhe has been long ſubject to biliary obſtructions, and is of an irritable habit, with cauſes of continual uneaſineſs, that diſorder her ſtomach, and the ſecretions of the liver.

Collections of viſcid ſordes in the duodenum are probably frequent cauſes of Convulſive Aſthma, in which wheezing and uneaſineſs at the præcordia and ſternum may be ſymptoms, as the ſtomach muſt ſuffer very much from flatulence and indigeſtion. In theſe caſes the feces are not regularly mixed with bile; and the bowels, of courſe, are ſubject to coſtiveneſs.

CASE VI.

Mr. J. aged 40, had ſuffered this ſtate of the bowels, more or leſs, for five years; and, unfortunately, as it became more habitual, he more neglected it. At length he had a paroxyſm of Convulſive Aſthma, accompanied with a bilious countenance, and ſome tenderneſs at the pit of the ſtomach. He had alſo previouſly experienced pains ſhooting from that part to his back. He had had many fits in the preceding eighteen months before he applied to me in the ſpring of laſt year. Tinct. opii. relieved them, but they did not go off till he had had ſtools, and ſoon returned. I found he had lived luxuriouſly without ſufficient exerciſe. I recommended him to go to Cheltenham:—he complied, and had relief from dyſpnœa that had affected him in the remiſſions, almoſt directly. On his road from Ireland to this town he had a ſevere paroxyſm; but he ſtaid at Cheltenham ſix weeks, and had none. He had alſo been free from any return in March laſt, when I underſtood he had taken a great deal of exerciſe during the winter, and had vigorous health.

Dyſpeptic diſorders are much connected with affections of the liver, as may be ſuppoſed from the uncertain diſcharges of bile into the duodenum in theſe caſes.

The properties of the bile are ſometimes ſo offenſive, when it has obtained a free paſſage, as to occaſion the re-actions of Aſthma.

CASE VII.

A young lady, aged 22, had had a ſtomach complaint for a conſiderable time. Suddenly ſhe had a diarrhæa, in which the feces were nearly black. The firſt impreſſion created a fainting fit; but, after one copious diſcharge, ſhe was greatly revived. In two hours after ſhe had convulſive reſpiration, which was relieved by more ſtools. Two months afterwards ſhe had a true paroxyſm of Aſthma, which came on after dinner. I ſaw her in this ſtate, and was made acquainted with previous circumſtances. She had had warning at the ſame hour in two preceding days, by pains of the ſtomach, which were diſregarded, as her ſpirits and health were apparently good. Her bowels were coſtive; ſhe had not been troubled with cough, or any dyſpnœa; and had never wheezed. She had now the external re-actions in a violent manner, but only complained of ſtricture at the ſtomach. I directed an enema; after which ſhe had a puke, but diſcharged only the dinner ſhe had eaten. I then directed a doſe of opium, with æther; but the ſymptoms continued with violence. The time of the attack, and her previous complaints, then induced me to think that all means would be ſuperfluous before the firſt paſſages were emptied. I therefore directed a bolus of calomel and rhubarb; and a camphor mixture with kali and magneſia. The enema was repeated in two hours after the bolus. In three hours ſhe began to have motions, highly fetid, and dark-coloured: every motion relieved her breathing, and by night the paroxyſm was finiſhed.

My views in this caſe were aſſiſted by a recollection of Dr. Percival's remarks on the Atrabilis, in which he introduces ſome ſimilar inſtances, with a ſuggeſtion, that the bile might be a cauſe of the Convulſive Aſthma, rather than an effect. (See his Eſſays, Vol. II. p. 112.) There ſeems to be no reaſon for diſſenting from his opinion, which is ſufficiently defended, *a priori*, by the laws of muſcular re-action, however little they may have been noticed.

All the preceding caſes appeared to depend upon affections of the Abdominal Viſcera, not readily to be cured; or, where a cure could be obtained, the affected organ might probably be again diſeaſed, and the re-actions return.

The treatment of Convulſive Aſthma, in ſuch inſtances, cannot be therefore anſwered by a certain event; but it may be laid down upon principles leading to a cure, and its progreſs will be attended with relief.

In the following caſes, of the Firſt and Third Species, greater advantages were obtained; ſhewing the effect of medicine in a clear point of view.

CASE VIII.

William Millington, aged 50, March 11, 1799. He had been affected with Convulſive Aſthma many years, particularly in the winter. He has been now very bad for ſix months with conſtant dyſpnœa, accompanied with conſiderable ſickneſs when he moves. Flatulence and ſourneſs are very diſtreſſing. He coughs at uncertain times, and wheezes. At night the fit ſeizes him in bed, and prevents his lying down; and goes off regularly about five in the morning. He expectorates with difficulty. He is luſty, and has been uſed to hard work. His urine is copious and pale; his pulſe weak, but regular. He has had no clear intermiſſion for ſeveral weeks. I preſcribed rubig. ferri, and directed him to take a tea-ſpoonful three times a day in any vehicle.

March 15. He has taken nearly two ounces of the ruſt of iron. His dyſpnœa, flatulence, and acidity of the ſtomach are much leſs; his appetite is better, and his pulſe ſtronger: he coughs a good deal more, but ſpits with greater freedom; and his nights are ſo improved, that he expects to be very ſoon free from the fit. I ordered two ounces of rubigo ferri, to be repeated.

March 18. His ſtomach is much better than on the 13th. His cough is not ſo frequent, but he has a free expectoration. The mucus has a common appearance; but three weeks ſince it was dark-coloured. He now paſſes his nights in ſleep, and has no difficulty of breathing. His pulſe is 65, full and firm. He has no tightneſs at the præcordia. His belly is regular, and his feces are black. His urine is deeper coloured, and leſs in quantity. He has always been ſubject to nervous tremblings, which have encreaſed upon him the two laſt days, particularly on riſing in a morning. This ſeemed to be his only complaint: I, however, directed him to continue to take the ruſt of iron twice a day; and I preſcribed ſome tinct. of opium, with camphor mixture, to be taken at the ſame time.

April 17. No return of dyſpnœa or Aſthma. He has taken the powder and the mixture regularly. His tremor is much leſs, but not gone.

May 15. He has been taking rubigo ferri three times a day for a month; a tea-ſpoonful at a doſe. He has had no return of Aſthma, and his nervous complaint ſeldom affects him. He is now perfectly well.

CASE IX.

June 26, 1799. Mr. T. aged 36, is an engraver, and has had Convulſive Aſthma four or five years. The fits have been moſt ſevere in autumn, and in cold damp weather. Sourneſs, and flatulence of the ſtomach and bowels had been troubleſome for ſome time: Coughing and Spitting in the night followed theſe ſymptoms; and, after a while, a Convulſive paroxyſm attacked him in place of his cough. He has now, in the day, a ſhort cough and dyſpnœa; and he has had regular fits the fourteen laſt nights. His ſtomach diſorder ſtill predominates, and is always worſe when the Aſthma is worſe.

R. Pulv. Cretæ ppt. ʒii.
Vini Ipecacohan. ℥ſs.
Aquæ Menthæ piperit. ℥vſs. m.
Capiat Cochl. largum ter in die.

June 30th. Since the firſt day of his taking the medicine, his ſtomach has been free from diſorder, and his nights have been paſſed without the fit. According to direction, he has entirely avoided malt liquor, garden-ſtuff, and tobacco. He had a nauſea from the medicine, but did not puke; and the ſenſation accompanying it ſeemed to go downwards in his bowels, followed ſometimes, but not always, by a ſtool.

I now preſcribed as follows:

R. Rubiginis ferri ʒiii.
Pulv Rhei ʒſs.
Ol. Menth. piperit. gtt. x
Mucilag. q. s. fiant pilulæ 40

—Capiat tres mane et veſpere. Inſuper bibat hauſtum aquæ puræ cum guttis quindecim ſequentis:

R. Elixir Vitriol. Acid. ℥iſs.

June 19, 1800. He has only had two mild fits in the winter from taking cold. He has been much better upon the whole, but has not quite loſt his ſtomach complaint, which attacks him when he eats ſalt meats or bacon. He has returned to vegetables, and he takes malt liquor in moderation. This patient may perfectly recover, if he will entirely abandon improper diet, and be leſs ſedentary.

CASE X.

Mr. S. 38 years old. This gentleman retired from London three years ſince, to a reſidence in

Hertfordſhire, in conſequence of the attacks of Convulſive Aſthma, which had affected him ſeveral years. He attributes the diſeaſe to a cold taken after profuſe perſpiration in a public place: but he had previouſly habitual indigeſtion, and the firſt paroxyſm came after a luxurious dinner, and a great deal of wine. He has regulated himſelf by advice, and taken the preſcriptions of very eminent phyſicians, without benefit. He is ſtill attacked with Convulſive Aſthma, and ſays, the country is only to be preferred to the town, as it gives him a better opportunity of being quiet, and free from the temptations of pleaſure. On the other hand, he thinks himſelf too much affected with cold in the country. He has not taken medicine, except in the paroxyſms, in which he took æther, opium, and pukes of Ipecacohan. The paroxyſm returns every three weeks in the winter: in the ſummer months he is more free from it. He ſpits at the termination, and ſometimes has a diarrhœa. He wheezes in the fit; and has frequently, but not always, dyſpnœa in the intervals. He has been cautioned to preſerve a proper diet, but often breaks his rules. He was very robuſt a few years ſince, but he has loſt fleſh, and weighs about eleven ſtone. His bowels are lax—his pulſe regular. If he eats garden-ſtuff, or drinks malt liquor, he is certain of a purging, with dyſpnœa, and expects the paroxyſm.

May 10, 1798. I had the hiſtory of his complaints; and found, that in conſequence of ſome imprudence, the firſt paſſages were, at this time, particularly weakened and diſordered. I earneſtly recommended a rigid attention to diet, and exerciſe on horſeback. I preſcribed two grains of rhubarb, with chalk and ginger, to be taken twice a day, with an infuſion of quaſſia wood.

June 20th. He had had a paroxyſm. His ſtomach was leſs diſordered, but he had been purged by the medicines, which was an effect I did not wiſh for. I directed ten grains of rubigo ferri, with three grains of pulv. ipecac. compoſit. to be taken twice a day, with infuſion of quaſſia. After a time, he took the ruſt alone. In December, 1798, he had a moderate fit; but this is the only attack he has ſuffered ſince he took the ruſt of iron. In May 1800, he was in good health, and capable of cold bathing.

CASE XI.

Mr. Jones, a young man of 30, had been for ſome time affected with Convulſive Aſthma. After the paroxyſms he expectorated mucus, mixed with blood. As he had no inflammatory diſpoſition in his habit, I judged that the blood eſcaped from the pulmonary capillaries in conſequence of their weakneſs, rather than from the force of the circulation. He wheezed, and there was dyſpnœa in the day.

June 1798, I preſcribed pills of rubigo ferri, with extractum cinchonæ; the vitriolic acid in water and cold bathing. He ſlept in the country. The event coincided with my views. Having continued the uſe of theſe means for many months, he was entirely free from diſeaſe: and for the laſt year has had no ſymptom of Aſthma.

CASE XII.

Mr. Pariſh. This patient is 40 years of age. In 1792, he found himſelf weak and low, and was affected with Difficulty of Breathing. The dyſpnœa increaſed; and at length he had a paroxyſm of Convulſive Aſthma that attacked him by night, generally an hour after he had lain down in bed. It was diſtinguiſhed by a very particular ſtifling ſenſation in the throat, occaſioned, as he believes, by the wind in his ſtomach.

His wheezing in the paroxyſm might be heard all over the houſe; and this ſymptom troubled him in the day, if he had taken cold, which he became liable to do. He had coughing fits which ſeemed to come on when flatulence was moſt diſtreſſing. He expectorated in the morning, but not conſiderably. Though his firſt complaint ſeemed to be in the ſtomach, he had no ſickneſs, but great oppreſſion, with very ſour eructations. He had alſo very often a ſcorbutic eruption on his ſkin. He was firſt attended by an eminent ſurgeon, who, after a few months, adviſed him to conſult a phyſician of great and deſerved reputation, in Birmingham. The diſeaſe was conſidered by them as an Aſthma, and treated without ſucceſs. At length he went into the country, and was, upon the whole, ſo ill, that his wife had been aſſured, that medicine would be of no uſe: and that, "if he lived a "month, it would be the outſide." Soon afterwards I ſaw him, and had the hiſtory of his diſorder. He had been ill ſix or ſeven years.

Auguſt 6, 1798, I preſcribed the following:

R. Rubig. Ferri ℥i
Pulv. Zinzib.—
Rhei āā ʒi
Conſerv. Cort. Aurant. ʒvi
Syr. q. s. ft. Elect. capiat. q. n. m. bis in die.

After he had taken of this electuary with the acid elixir of vitriol for five or ſix months, he found himſelf perfectly free from his complaint, and remains ſo. His recovery was progreſſive from the firſt day. He all the while refrained from vegetables, and was ſparing in malt liquor. The eruption was cured alſo.

Of the laſt five Caſes, I ſhould aſſign the IXth, Xth, and XIIth, to the Third Species. In theſe the ſtate of the ſtomach was ſufficiently morbid to excite Aſthma, without additional irritation; and the re-actions really appeared to be the effect of ſuch ſtate.

The ninth Caſe not being concluded, is only introduced to ſhew the advantage which attended the uſe of the chalk and ipecacohan mixture in the paroxyſm.

The patient's numerous engagements in buſineſs have made him neglect the means of a perfect recovery, which, however, under theſe obſtacles, is far advanced.

Millington took the rubigo ferri in large doſes, and even during the dyſpnœa, which was conſiderable in the remiſſions. I was not apprehenſive of a bad effect from its activity in his habit of body, which was fleſhy and pale. The bloody mucus ceaſed to be expectorated in the caſe of Mr. Jones under its conſtant exhibition.

It would be abſurd to detain the Reader with a long liſt of caſes of this deſcription, in all of which the oxyd of iron was eminently ſerviceable; and in the majority of which it effected cures. It is, in fact, a medicine of ſuch value, that, if it were new, or could be diſguiſed in a new name, it would obtain a general ſanction, and the credit of being ſpecific; not for the cure of a paroxyſm of Aſthma, but of Aſthma itſelf.

I leave the queſtion of the cauſe of its efficacy to be determined by others: but I have an opinion that oxygen is evolved much to the benefit of the habit; and poſſibly the evolution is promoted by giving vitriolic acid at the ſame time. In No. 96, of the Annales de Chimie, juſt publiſhed, oxygen is conſidered, medicinally, in a diſeaſe of the ſkin. I have often ſeen the ſkin greatly improved, and eruptions diſappear under a courſe of oxyd of iron. In the caſe of Mr. Pariſh, this effect appeared.

The oxyd of iron is ſimilar to mercury in exciting the ſyſtem to new actions. But the febrile ſtate, occaſioned by iron, is followed by encreaſed and permanent vigour, whilſt oppoſite effects follow the mercurial fever. It was probably the firſt action which kept off the paroxyſms in a curious inſtance before me:

A gentleman in the North had been afflicted with Convulſive Aſthma a great number of years; and was adviſed, at one period, to take an ounce of crude quickſilver every night. He ſwallowed, upon the whole, four pounds, and had no paroxyſm for an unuſual length of time. This circumſtance being communicated to me, with many others belonging to the caſe, I thought it prudent to inquire, particularly, if viſceral obſtructions had attended it; I was informed, in reply, that no ſymptoms of obſtruction in the Viſcera had ever appeared, "and though the "quickſilver repelled the attacks, it deſtroyed his "appetite, and he was diſſuaded by a phyſician "from taking any more of it: and, had he con"tinued it, he is perſuaded it would have de"ſtroyed him ere now."

No ſuch bad conſequence is experienced from the uſe of iron: when it ſuſpends the paroxyſm it is operating a cure, and confirming the body againſt all relapſes.

Before the uſe of this oxyd, it may be prudent to conſider the conſtitution of the patient.

If the body be fleſhy, or fat, and the complexion pale, it cannot be injurious; and in proportion to the degree of dyſpepſia, and of mucous expectoration, the Aſthmatic will find advantage in uſing it. On the contrary, if he be thin and irritable, it may be neceſſary to combine it with opium, or extractum hyoſcyami, which is frequently more effectual than opium in abating the irritation which it ſometimes occaſions.

By this mode of combination, and in ſmall doſes, gradually encreaſed, it may be exhibited in the intermiſſions of almoſt every caſe of the Firſt and Third Species.

Cinchona is leſs adapted to the weakneſs which appears in Aſthma than any preparation of iron accompanied by bitters, or not; and for this reaſon I have ſeldom applied to it.

Reſpecting vinegar, it may be proper to obſerve, that, in many caſes that have fallen under my care in the laſt three years, I have not ſeen ſuch great advantages from its uſe as I expected from former experience. That vinegar and chalk can be uſeful in the ſame diſeaſe has cauſed ſurprize, but without good reaſon.

Vinegar conquers the weaker acid of the ſtomach, and ſtops the further fermentation of its contents, exciting the veſſels in its coats to a better action. Chalk may not do this, but it can neutralize the acidities already generated, and by this chemical alteration make them leſs acrimonious, or irritating.

When dyſpepſia can be conſidered diſtinctly as the immediate cauſe, chalk ſhould be preferred. I ſhould never neglect the additional ſecurity of tonics, though ſometimes alkalis may ſo far improve the ſtomach, as to turn the diſeaſe without the neceſſity of any further means.

Mr. B. P. had been many years affected with Aſthma, and had had much advice before he fell under the care of Dr. Bache, who favoured me with an account of the caſe.

This gentleman's diſeaſe was excited by taking cold after his ſtomach had been diſordered for ſeveral years. He appeared to be convinced that the ſtate of his ſtomach was the cauſe of his Aſthma; and remarked to me in a late converſation, that he had repeatedly ſaid, "if his "phyſicians could cure his ſour ſtomach, he "ſhould be well." Dr. Bache removed the diſeaſe by alcalies and abſorbents, and by promoting inſenſible perſpiration. He obſerved a predominant acid in the excretions of ſweat and urine; but this being a ſolitary fact in the hiſtory of Aſthma, cannot be made a foundation for general reaſoning or practice. Floyer tried the urine of Aſthmatics, but found no peculiar acid; and his report is confirmed by that of many others.

A ſour perſpiration has not been noticed by any Aſthmatics that I have attended. We cannot ſuppoſe that the alkali, circulated through the ſyſtem, neutralizing the acid fluid; it muſt have acted beneficially by improving digeſtion in the firſt place; and in the ſecond, bodily ſtrength. The fluids would conſequently be better prepared, and the vitious ſecretions of the ſtomach, which were both cauſe and effect of the dyſpepſia, being conquered, the re-actions of Aſthma would ceaſe, of courſe.

Dr. Wolcot has obligingly communicated to me the reſult of his perſonal experience, which confirms the fact of the very important influence that conditions of the ſtomach have upon Aſthma. He has found it neceſſary to take animal food frequently, but ſparingly, and he generally quits the table with an appetite. He abſtains from vegetables, particularly potatoes and greens, and experiences great diſtreſs in reſpiration, if he faſts many hours, and then eats a hearty meal.

I have nearly the ſame opinion of Bleeding as I before expreſſed. I do not affirm that the ſuffering in the paroxyſm may not be leſſened by this operation in ſome caſes of the Firſt Species, but the paroxyſm will not be ſuſpended by it; and the doubtful benefit will be more than balanced by the intermiſſions being rendered ſhorter, and more diſturbed with dyſpnœa.

The obſervations of many old Aſthmatics confirm me in this opinion. A gentlemen who has had the diſeaſe ſixteen years, (Mr. D. C. of Letheu, by Nairn, in Scotland), had been uſed to bleeding in the firſt three years, when his vigour of body correſponded with his age. He ſays, "though blood-letting produced a temporary "mitigation of the ſymptoms; yet, upon the "whole, his diſtreſs was aggravated by a frequent repetition of the operation."

In the old practice, blood-letting was much in uſe. Floyer preſcribed it, but made no cures in conſequence. This diſcharge and purging were often directed at the ſame time as tonics, an oppoſition ſufficiently explaining why the laſt were not ſucceſsful. As there is no real danger from the paroxyſm, I think a temporary relief is not worth purchaſing at the expence of delaying a cure.

The Second Species of Aſthma has occurred very ſeldom in my practice. Particular ſituations in the manufactories of this place have cauſed paroxyſms, which diſappeared by the patient's removal.

A young man, was ſome years ago affected with a Spitting Aſthma; but he has lately had the fit without expectoration; and his emaciated habit, with ſhooting pains in the cheſt, indicate a tendency to phthiſis. It is obvious, that, in ſuch caſes, tonics muſt be carefully abſtained from.

I have not inſerted caſes of the Fourth Species as the practical difficulty is chiefly attached to the preceding ſtate. Of the laſt five caſes, Antiſpaſmodics were only given in Millington's; and then not in the paroxyſms, but after the Aſthma was overcome.

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NOTE.

A Practitioner, in Birmingham, has addreſſed me in a Letter, with Obſervations on Aſthma. He ſays, truly, that I am "*unknown to him.*" But he has mixed his private affairs with the profeſſed ſubject:——and this circumſtance has determined me to avoid all controverſy with the Writer.

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